12

Science and technology



Research and development (R & D) is often considered as a driving force behind economic growth, job creation, innovation, and the subsequent increasing quality of products. The seventh framework programme for research and technological development (FP7) is the EU's main instrument for funding research in Europe (108); it runs from 2007-2013. The main aims of FP7 are to increase Europe's growth, competitiveness and employment. This is done through a number of initiatives and existing programmes including, the competitiveness and innovation framework programme (109), educational and training programmes, as well as regional development through structural and cohesion funds. The FP7 is also a key pillar of the European Research Area (110), where the European Commission conducted a debate during 2007 on what should be done to create a unified and attractive research area to meet the needs of business, the scientific community and citizens. FP7 is made up of four broad programmes (cooperation, ideas, people and capacities) and a fifth specific programme on nuclear research. The ten thematic areas that are covered by FP7 cooperation include: health, food, agriculture and biotechnology, information and communication technologies, nanosciences, nanotechnologies, materials and new production technologies, energy, environment, transport, socio-economic sciences and humanities, space and security.

(108) For more information: http://cordis.europa.eu/fp7/home_en.html.

(109) For more information: http://cordis.europa.eu/innovation/en/policy/cip.htm.

(110) For more information: http://ec.europa.eu/research/era/index_en.html.

The European Atomic Energy Community (Euratom) adopts a separate framework programme for nuclear research and training activities, with the current programme spanning the period 2007-2011 (111). There are two associated specific programmes covering the Joint Research Centre's direct actions and nuclear research and training indirect actions in the fields of fusion energy research and nuclear fission and radiation protection.

Information technology is developing day by day. However, the information society, a society whose wealth and growth are based on its ability to handle information efficiently, is not only a technical phenomenon, it is also transforming the way in which we communicate, do business, and live everyday lives. It holds enormous potential and opportunities for Europe's economy and societies. The i2010 initiative (112) is the European Commission's strategic policy framework in this area, laying out broad policy guidelines for the information society and the media in the years up to 2010. It is designed to promote an open and competitive digital economy, research into information and communication technologies, as well as their application to improve social inclusion, public services and the quality of life.

(111) For more information: http://cordis.europa.eu/fp7/euratom/home_en.html.

(112) For more information: http://ec.europa.eu/information_society/eeurope/i2010/index_en.htm.

Eurostat data in this domain:
Science and technology

- Research and development
- Community innovation survey
- High-tech industry and knowledge-intensive services
- Patent statistics
- Human resources in science & technology
- Information society statistics

12.1 PERSONNEL

INTRODUCTION

Researchers are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems, and in the management of the projects concerned.

The European Commission has placed renewed emphasis on the conversion of Europe's scientific expertise into marketable products and services, while also focusing on improving the mobility of European researchers, encouraging networks between researchers from different Member States, and promoting R & D as an occupation for women.

This latter point has been one particular area of concern for policy makers who consider that women's intellectual potential, and their contribution to society are not being fully capitalised upon. In particular, their participation is low in certain branches of the natural sciences, engineering and technology, which are considered key R & D areas. Furthermore, women are also under-represented in the business enterprise sector where the EU's R & D is most highly intensive, as well as in senior academic grades and influential positions [113].

DEFINITION AND DATA AVAILABILITY

Data on scientific and technical R & D personnel provide indicators for useful international comparisons of human resources devoted to R & D. For statistical purposes, indicators on R & D personnel are compiled by gender in terms of persons as head counts (HC), as full-time equivalents (FTEs), or person-years.

Eurostat also compiles a number of series in relation to stocks of human resources in science and technology (HRST) with breakdowns available according to gender, age, region, sector of activity, occupation, educational attainment and fields of education (although it should be noted that not all combinations are possible). This information is derived from the Labour Force Survey (LFS). HRST indicators are presented as absolute figures and as shares of the economically active population in the age group 25-64. HRST are defined as persons having either successfully completed tertiary education, or persons who are employed in an occupation where such an education is normally required.

Data on employment in high-technology and knowledge-intensive sectors and related derived indicators are also built-up using data from the LFS; these data are available both at the national and regional level.

Education statistics are based on the International Standard Classification of Education (ISCED). The basic unit of classification in ISCED-97 is the educational programme. The number of PhD graduates is measured by graduates from ISCED level 6. Indicators on the number of PhD students provide an idea of the extent to which countries will have researchers at the highest level. The number of graduates refers to new graduates in the reference year, not the total number available in the labour market in that year. The term PhD is defined in terms of general tertiary programmes which lead to the award of an advanced research degree, e.g. a doctorate in economics. The programmes are therefore devoted to advanced study and original research and are not based on course-work alone. They usually require 3-5 years of research and course work, generally after a master's degree.

The indicator of tertiary graduates in science and technology includes new graduates from all institutions completing graduate and post graduate studies in science and technology fields, and is calculated as a percentage of all graduates.

MAIN FINDINGS

The number of researchers in the EU-25 regularly increased in recent years. There were approximately 1.2 million researchers in full-time equivalents in the EU-25 in 2004, which marked a 13 % increase on the level from 2000. According to a gender breakdown, men accounted for the majority of researchers in all sectors, and represented about three quarters of the total R & D workforce. There was almost no change in the proportion of male and female researchers during the period 2000-2004.

The gender split among PhD students in 2005 was generally much more balanced; a small majority of PhD students were female in the Baltic Member States, Portugal, Italy, Finland and Cyprus, and women accounted for at least 40 % of PhD students in all of the other Member States for which data are available, with the exception of the Czech Republic and Malta.

(113) For more information: http://ec.europa.eu/research/science-society/index.cfm?fuseaction=public.topic&id=27.

Turning to a breakdown of the number of researchers by institutional sector, there were different patterns among the Member States. The business sector concentrated more than 60 % of all researchers in Germany, the Netherlands, Denmark, Sweden, Austria and Luxembourg in 2005. Bulgaria was the only country to report a majority of its researchers in the government sector (more than 60 %), while Greece, Poland, Lithuania and Latvia had the highest proportion of their R & D personnel in the higher education sector.

The Nordic countries reported the highest proportion of R & D personnel as a share of the total labour force, usually twice the EU-25 average, which stood at 1.4 % in 2005.

Germany had a relatively high proportion of total employment within high- and medium-high-technology sectors, while in the services sector, Sweden, Denmark, the United Kingdom and the Netherlands had the highest shares of total employment in knowledge-intensive services (KIS) in 2006 (for definitions of the composition of these sectors, see the glossary at the end of the publication).

SOURCES

Statistical books

Science, technology and innovation in Europe

Pocketbooks

Science, technology and innovation in Europe – 2007 edition

Website data

Research and development

Statistics on research and development

R&D personnel at national and regional level

Human resources in science & technology

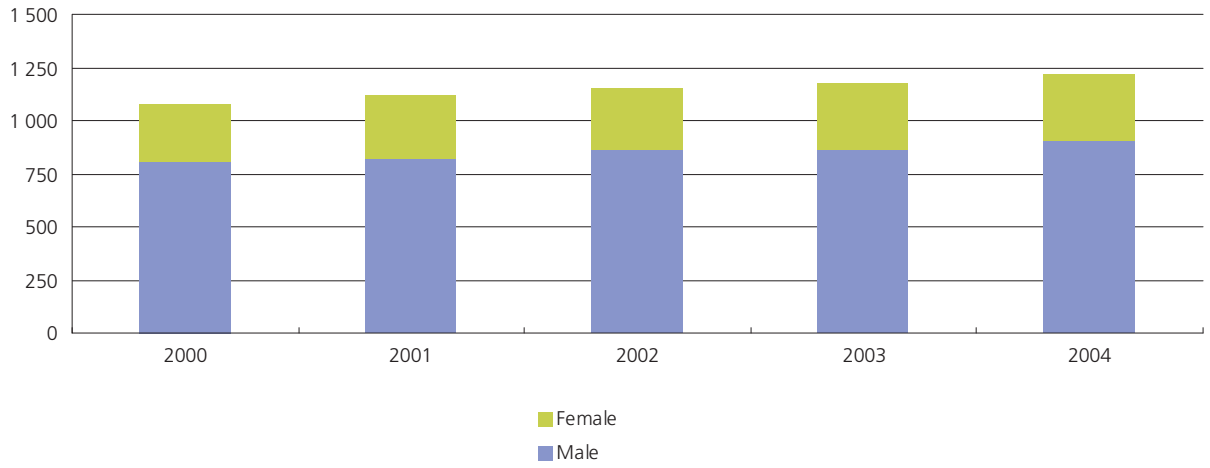
Stocks of HRST at the national and regional levels; unemployment for HRST and non-HRST

Flows of HRST at the national level: education inflows and job-to-job mobility

Data on HRST and mobility derived from the 2001 round of population and housing censuses

Figure 12.1: Researchers in all institutional sectors, EU-25 (1)

(1 000 FTE)



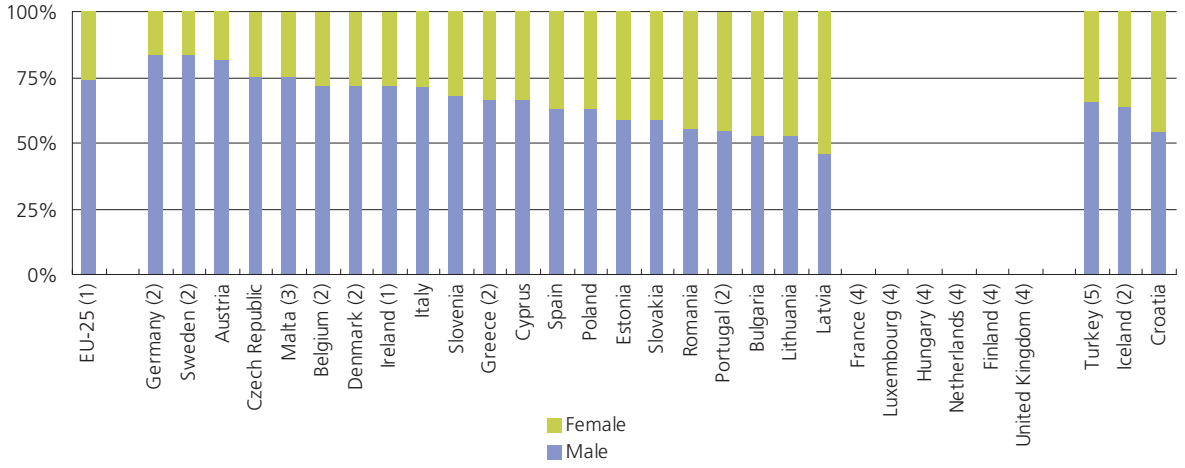
(1) Estimates.

Source: Eurostat (tsc00004 and tsc00006)

Researchers are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems, and in the management of the projects concerned. FTE (Full-time equivalent) corresponds to one year's work by one person (for example, a person who devotes 40 % of his time to R&D is counted as 0.4 FTE.

Figure 12.2: Gender breakdown of researchers in all institutional sectors, 2004

(% of total researchers)



(1) Estimates.
(2) 2003.
(3) Break in series.
(4) Not available.
(5) 2002.

Source: Eurostat (tsc00006)

Table 12.1: Researchers, by institutional sector, 2005 (1)

	Total - all sectors	Business enterprise sector		Government sector		Higher education sector	
	(1 000 FTE)	(1 000 FTE)	(% of total)	(1 000 FTE)	(% of total)	(1 000 FTE)	(% of total)
EU-25 (2)	*1 217.5*	*599.1*	*49.2*	*159.6*	*13.1*	*445.8*	*36.6*
Euro area (3)	*834.0*	*425.3*	*51.0*	*117.5*	*14.1*	*283.4*	*34.0*
Belgium	*32.0*	*16.3*	*50.9*	*2.2*	*7.0*	*13.2*	*41.2*
Bulgaria	10.1	1.2	11.5	6.1	60.4	2.6	25.9
Czech Republic	24.2	10.4	42.8	6.1	25.3	7.6	31.3
Denmark	*28.2*	*17.7*	*62.7*	*2.0*	*7.2*	*8.3*	*29.4*
Germany	*268.1*	*162.0*	*60.4*	*40.1*	*15.0*	*66.0*	*24.6*
Estonia	*3.3*	*0.9*	*26.5*	0.5	14.2	1.9	57.2
Ireland	*11.2*	*6.4*	*57.4*	*0.5*	*4.6*	*4.2*	*38.0*
Greece	*17.0*	*4.3*	*25.4*	*2.3*	*13.6*	*10.3*	*60.2*
Spain	*109.8*	*35.5*	*32.4*	*20.2*	*18.4*	*53.8*	*49.0*
France (2)	200.1	106.4	53.2	24.8	12.4	65.5	32.7
Italy (2)	72.0	27.6	38.3	14.2	19.8	28.2	39.2
Cyprus	*0.6*	*0.1*	*19.0*	*0.1*	*17.5*	*0.4*	*59.5*
Latvia	3.3	0.5	14.3	0.6	17.9	2.2	67.8
Lithuania	7.6	0.7	9.4	1.8	23.6	5.1	67.0
Luxembourg	*2.1*	*1.5*	*73.3*	*0.4*	*18.3*	*0.2*	*8.4*
Hungary	15.9	5.0	31.5	5.0	31.2	5.9	37.2
Malta	*0.4*	*0.2*	*42.7*	0.0	6.3	0.2	50.9
Netherlands (4)	37.3	*22.7*	*60.8*	7.0	18.9	10.2	27.4
Austria	*28.2*	*17.9*	*63.6*	*1.1*	*4.0*	*9.0*	*31.9*
Poland	62.2	9.4	15.1	12.2	19.6	40.4	65.1
Portugal	*21.0*	*4.1*	*19.6*	*2.9*	*14.0*	*11.1*	*53.0*
Romania (2)	21.3	9.1	42.8	6.3	29.8	5.7	26.6
Slovenia	3.8	1.9	49.6	1.2	30.3	0.7	19.4
Slovakia	10.9	1.9	17.8	2.5	22.9	6.5	59.1
Finland	39.6	22.0	55.5	4.4	11.1	12.9	32.5
Sweden	54.0	34.1	63.0	2.8	5.3	16.8	31.1
United Kingdom (5)	:	95.1	:	9.2	:	:	:
Croatia (2)	7.1	1.0	14.2	2.4	33.9	3.7	51.9
Turkey (6)	24.0	3.7	15.4	2.8	11.5	17.5	73.1
Iceland (2)	2.0	0.9	44.2	0.5	24.1	0.6	29.0
Norway	*21.9*	*11.4*	*52.2*	*3.4*	*15.8*	*7.0*	*32.0*
Switzerland (2)	25.4	12.6	49.8	0.4	1.7	*12.3*	*48.6*
Japan (7)	675.3	458.8	67.9	33.7	5.0	172.4	25.5

(1) Shares do not always sum to 100 % due to estimates, differences in reference years and the conversion of data to a count in terms of FTE.
(2) 2004.
(3) EA-12; 2004.
(4) Total – all sectors and higher education sector, 2003; government sector, break in series.
(5) Government sector, 2004.
(6) 2002.
(7) 2003.

Source: Eurostat (tsc00004), OECD

Table 12.2: PhD students (ISCED level 6), 2005

(% of total PhD students)

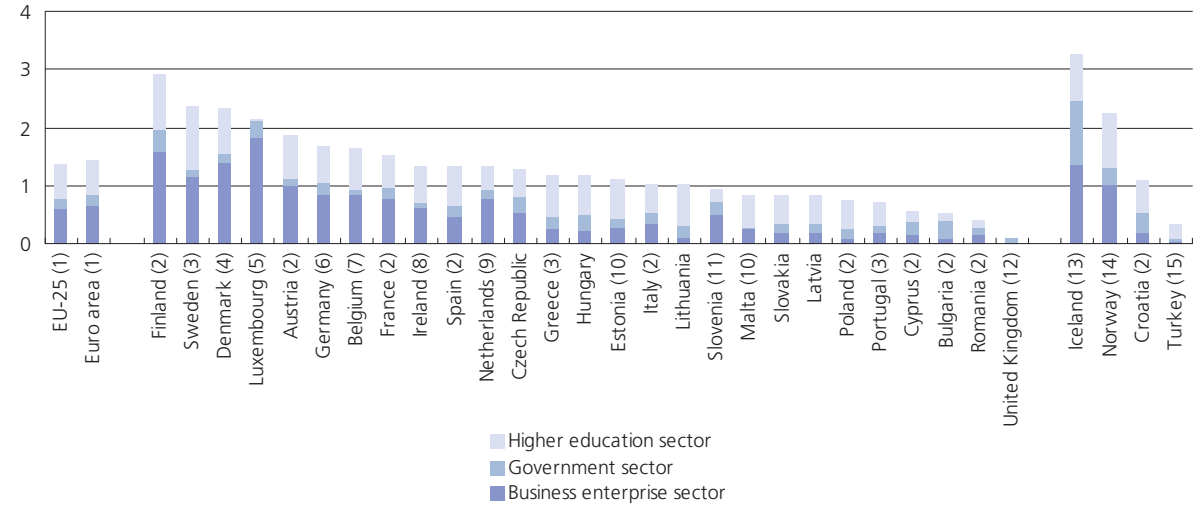
	Total number of PhD students (1 000)	Male	Female	Social sciences, business & law	Teacher training & education; humanities & arts	Science, maths & computing; engineering, manufacturing & construction	Agriculture & veterinary	Health & welfare; services	Others (1)
Belgium	7.4	59.7	40.3	19.8	13.1	45.9	6.9	14.4	0.0
Bulgaria	5.1	50.2	49.8	20.3	23.9	39.1	3.7	13.0	0.0
Czech Republic	24.9	63.0	37.0	14.9	15.2	50.2	5.2	14.4	0.0
Denmark	4.4	54.5	45.5	13.6	14.7	38.0	8.8	24.9	0.0
Germany	:	:	:	:	:	:	:	:	:
Estonia	1.8	47.4	52.6	19.8	19.6	41.8	6.2	12.6	0.0
Ireland	4.8	52.4	47.6	13.4	22.0	50.6	2.1	10.0	1.9
Greece	22.3	56.7	43.3	17.5	22.6	55.9	1.7	2.2	0.0
Spain	76.3	48.8	51.2	24.2	22.8	24.8	2.3	18.7	7.2
France	:	:	:	:	:	:	:	:	:
Italy	37.5	48.8	51.2	19.9	15.7	43.3	5.9	14.9	0.3
Cyprus	0.3	49.8	50.2	23.9	23.9	52.2	:	:	0.0
Latvia	1.4	41.8	58.2	31.9	27.4	30.1	1.9	8.7	0.0
Lithuania	2.8	43.1	56.9	31.9	:	39.9	4.2	:	24.0
Luxembourg	:	:	:	:	:	:	:	:	:
Hungary	7.9	55.5	44.5	22.2	24.7	31.1	6.3	15.7	0.0
Malta	0.1	69.8	30.2	18.9	32.1	20.8	:	28.3	0.0
Netherlands	7.4	58.6	41.4	:	:	:	:	:	:
Austria	15.8	54.7	45.3	38.2	24.7	29.9	3.4	3.8	0.0
Poland	33.0	51.7	48.3	20.5	29.9	35.2	5.6	8.8	0.0
Portugal	18.4	44.0	56.0	26.1	25.9	31.9	2.7	13.5	0.0
Romania	22.3	52.7	47.3	22.3	:	34.8	3.2	:	39.7
Slovenia	1.0	53.9	46.1	13.6	14.1	51.2	2.5	18.6	0.0
Slovakia	10.3	59.1	40.9	20.4	18.4	38.7	3.9	18.5	0.0
Finland	21.6	49.2	50.8	22.7	24.2	40.3	2.1	10.7	0.0
Sweden	22.2	52.1	47.9	12.4	13.0	41.8	2.0	30.8	0.0
United Kingdom	91.6	55.7	44.3	19.2	21.8	42.1	1.5	15.2	0.1
Croatia	1.0	51.4	48.6	10.6	19.0	33.8	7.2	29.5	0.0
Turkey	27.4	60.0	40.0	23.1	22.4	33.9	8.0	12.6	0.0
Iceland	0.1	41.0	59.0	14.2	30.6	28.4	0.0	26.9	0.0
Norway	4.4	56.8	43.2	16.2	12.6	44.9	5.0	21.2	0.0
Switzerland	16.6	60.7	39.3	25.7	15.3	39.9	2.8	16.0	0.3
Japan	73.5	70.8	29.2	13.3	13.7	33.0	5.9	32.4	1.6
United States	384.6	48.7	51.3	26.8	24.4	30.4	0.8	17.6	0.0

(1) Unknown or not specified.

Source: Eurostat (educ_enrl5)

Figure 12.3: Proportion of research and development personnel by sector, 2005

(% of the total labour force)



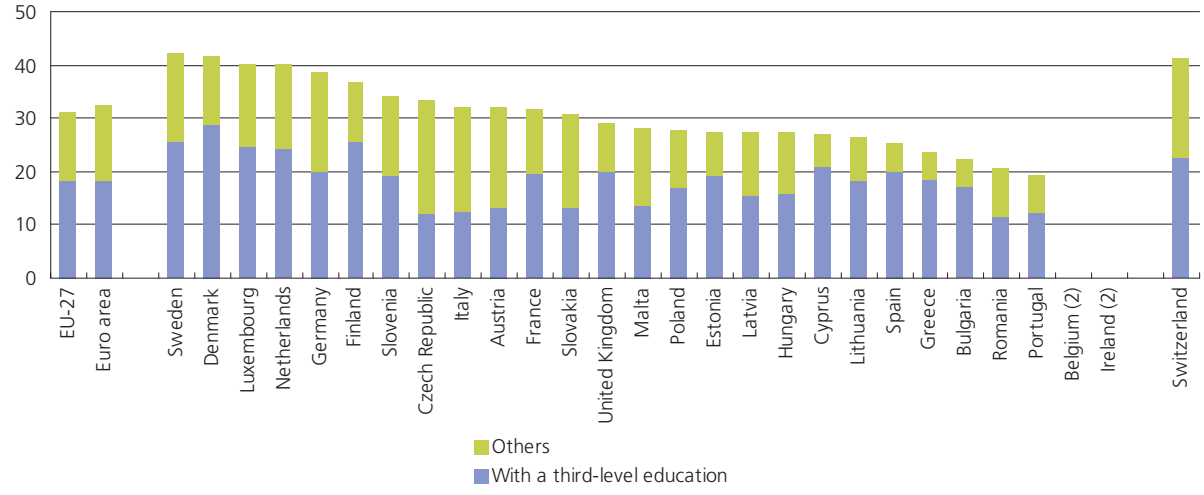
(1) 2004; estimates.
(2) 2004.
(3) 2003.
(4) Business enterprise sector, 2004; government sector and higher education sector, estimates.
(5) 2003; higher education sector, estimate.
(6) Government sector and higher education sector, 2004; business enterprise sector, 2003.
(7) Business enterprise sector, 2004 and estimate; government sector and higher education sector, 2003.
(8) Business enterprise sector, 2004 and estimate; government sector, estimate; high education sector, 2004.
(9) Business enterprise sector, estimate; higher education sector, 2003 and estimate.
(10) Business enterprise sector, estimate.
(11) Estimates.
(12) Government sector, 2004; business enterprise sector and higher education sector, not available.
(13) Government sector, 2004; business enterprise sector and higher education sector, 2003.
(14) Business enterprise sector and government sector, 2004; higher education sector, 2003.
(15) 2002.

Source: Eurostat (tsc00002)

R&D personnel include all persons employed directly on R&D, plus persons supplying direct services to R&D, such as managers, administrative staff and office staff. Head count (HC) data measure the total number of R&D personnel who are mainly or partly employed on R&D. R&D personnel in HC are expressed as a percentage of the labour force (comprises of population aged 15 and over who are employed or unemployed but not inactive).

Figure 12.4: Human resources working in science and technology occupations, 2006 (1)

(% of total employment)



(1) Break in series.
(2) Not available.

Source: Eurostat (hrst_st_nocc)

Table 12.3: Human resources in science and technology (1)

	People working in a S&T occupation					People who have a third level education and work in a S&T occupation				
	(1 000)	(% of total employment)				(1 000)	(% of total employment)			
	2006	2003	2004	2005	2006	2006	2003	2004	2005	2006
EU-27	56 925	29.5	30.4	30.7	31.2	33 025	16.7	17.5	17.9	18.1
Euro area	37 539	30.8	31.8	32.1	32.5	21 067	17.1	17.9	18.3	18.2
Belgium	:	31.7	32.2	33.5	:	:	22.5	23.1	23.3	:
Bulgaria	635	25.2	23.8	24.1	22.4	488	17.8	17.3	17.7	17.2
Czech Republic	1 467	31.0	31.6	33.3	33.4	537	10.8	11.2	11.9	12.2
Denmark	983	38.7	39.2	40.6	41.5	676	25.8	26.7	27.7	28.5
Germany	12 471	36.5	36.9	37.5	38.2	6 412	18.7	19.3	20.0	19.7
Estonia	152	25.6	25.0	28.0	27.4	106	17.1	16.4	18.5	19.2
Ireland	:	25.0	25.7	25.0	:	:	18.4	19.0	18.7	:
Greece (2)	970	21.2	22.9	22.8	23.8	754	16.3	18.0	17.8	18.5
Spain	4 435	23.6	24.8	25.5	25.2	3 519	18.0	19.2	19.7	20.0
France	7 093	31.3	31.4	31.9	31.7	4 383	18.7	18.8	19.4	19.6
Italy (2)	6 785	29.0	31.1	30.5	32.2	2 633	11.0	11.9	11.9	12.5
Cyprus	85	27.8	26.9	26.6	27.1	65	20.9	20.6	19.7	20.9
Latvia (3)	250	24.1	23.5	25.6	27.2	142	11.6	13.3	15.1	15.5
Lithuania	353	23.8	25.1	27.4	26.2	245	15.2	16.7	18.8	18.1
Luxembourg (3)	74	33.9	40.1	39.6	40.3	45	14.6	24.0	26.7	24.8
Hungary	987	26.2	26.9	26.1	27.1	569	14.2	15.2	14.9	15.7
Malta	35	25.0	25.5	28.0	28.1	17	10.6	13.3	14.0	13.5
Netherlands (3)	2 719	40.2	41.6	41.5	39.8	1 640	22.2	24.4	25.0	24.0
Austria (2)	1 075	26.5	33.9	32.5	32.1	443	12.3	14.1	13.6	13.2
Poland	3 577	26.5	26.8	27.1	27.6	2 194	14.0	15.1	16.0	17.0
Portugal (2)	842	15.7	18.6	18.6	19.2	524	9.3	11.5	11.5	12.0
Romania	1 652	18.7	19.1	19.5	20.5	935	9.2	10.2	10.6	11.6
Slovenia	286	30.9	31.3	32.9	33.8	162	16.1	16.5	17.7	19.2
Slovakia	634	29.4	29.2	30.0	30.6	274	11.1	11.7	12.6	13.2
Finland	789	34.5	35.5	35.9	36.7	550	24.5	25.2	25.1	25.6
Sweden	1 641	40.9	41.5	42.0	42.2	1 005	23.6	24.2	25.4	25.8
United Kingdom	6 935	27.2	27.9	28.2	29.1	4 704	18.4	19.1	19.3	19.8
Iceland	:	35.2	34.9	38.4	:	:	22.5	22.2	24.3	:
Norway	:	37.9	39.0	40.4	:	:	25.3	26.1	27.7	:
Switzerland	1 396	39.2	39.9	40.2	41.1	763	20.2	20.9	21.8	22.5

(1) Break in series, 2006.
(2) Break in series, 2004.
(3) Break in series, 2003.

Source: Eurostat (hrst_st_nsec)

Table 12.4: Science and technology graduates

(tertiary graduates in science and technology per 1 000 persons aged 20-29 years)

	Total		Male		Female	
	2000	2005	2000	2005	2000	2005
EU-27	*10.2*	13.2	*13.9*	17.8	*6.4*	8.4
Euro area	*10.2*	13.4	*14.1*	18.6	*6.1*	8.1
Belgium	9.7	10.9	14.4	15.7	4.9	6.0
Bulgaria	6.6	8.6	7.0	9.9	6.1	7.3
Czech Republic	5.5	8.2	7.8	11.7	3.0	4.6
Denmark	11.7	14.7	16.5	19.3	6.8	10.1
Germany	8.2	9.7	12.6	14.5	3.6	4.8
Estonia	7.0	12.1	9.0	13.5	5.0	10.7
Ireland	24.2	24.5	29.8	33.8	18.5	15.0
Greece	:	10.1	:	11.5	:	8.7
Spain	9.9	11.8	13.3	16.2	6.4	7.2
France	19.6	22.5	27.0	32.0	12.1	12.9
Italy	5.7	11.6	7.2	14.3	4.3	8.7
Cyprus	3.4	3.6	4.9	4.3	2.0	2.7
Latvia	7.4	9.8	10.1	13.0	4.7	6.5
Lithuania	13.5	18.9	17.2	24.2	9.7	13.5
Luxembourg	1.8	:	:	:	:	:
Hungary	4.5	5.1	6.8	7.0	2.1	3.1
Malta	3.4	3.4	4.9	4.6	1.9	2.1
Netherlands	5.8	8.6	9.5	13.6	2.1	3.5
Austria	7.2	9.8	11.6	14.8	2.9	4.6
Poland	6.6	11.1	8.3	13.9	4.8	8.3
Portugal	6.3	12.0	7.3	14.3	5.4	9.7
Romania	4.9	10.3	6.2	12.1	3.5	8.5
Slovenia	8.9	9.8	13.3	14.1	4.2	5.3
Slovakia	5.3	10.2	7.3	12.9	3.2	7.3
Finland	16.0	17.7	22.7	24.3	8.9	10.8
Sweden	11.6	14.4	15.5	18.7	7.6	9.9
United Kingdom	18.5	18.4	25.2	25.3	11.9	11.4
Croatia	:	5.7	:	7.5	:	3.8
FYR of Macedonia	3.7	4.0	4.2	4.1	3.1	3.8
Turkey	:	5.7	:	8.0	:	3.3
Iceland	8.4	10.1	10.3	12.5	6.5	7.6
Liechtenstein	:	12.7	:	18.1	:	7.3
Norway	7.9	9.0	11.4	13.1	4.3	4.7
Japan	12.6	13.7	21.5	23.0	3.3	4.1
United States	9.7	10.6	13.0	14.2	6.2	6.8

Source: Eurostat (tsiir041, tsiir043 and tsiir042)

The indicator tertiary graduates in science and technology includes new tertiary graduates in a calendar year from both public and private institutions completing graduate and post graduate studies compared to an age group that corresponds to the typical graduation age in most countries. It does not correspond to the number of graduates in these fields who are available in the labour market in this specific year. The levels and fields of education and training used follow the 1997 version of the International Standard Classification of Education (ISCED97) and the Eurostat manual of fields of education and training (1999).

Table 12.5: Proportion of persons working in high- and medium-high-technology manufacturing and knowledge-intensive service sectors

(% of total employment)

	Employment in high- and medium-high-technology manufacturing			Employment in knowledge-intensive services		
	1996	2001	2006	1996	2001	2006
EU-27	:	*6.0*	*5.6*	:	*30.8*	*32.6*
Euro area	:	*6.3*	*5.9*	:	*30.4*	*32.8*
Belgium	6.4	6.0	6.0	34.6	37.8	38.6
Bulgaria	:	5.0	4.3	:	23.1	21.7
Czech Republic	:	7.6	8.8	:	24.1	25.0
Denmark	5.9	6.0	5.0	40.1	42.7	43.8
Germany	9.2	9.3	9.0	27.9	31.0	34.3
Estonia	:	3.9	2.6	:	28.0	26.8
Ireland	4.4	3.7	3.0	30.1	31.9	34.9
Greece	2.1	2.0	2.0	20.5	22.5	24.9
Spain	4.6	4.9	4.1	23.6	24.8	27.0
France	5.5	5.8	5.1	33.6	35.0	36.4
Italy	6.3	6.3	6.2	24.7	26.9	30.1
Cyprus	:	1.0	0.8	:	26.5	28.3
Latvia	:	1.6	1.5	:	24.7	24.5
Lithuania	:	2.5	1.8	:	26.8	25.0
Luxembourg	1.4	1.0	:	33.4	35.8	:
Hungary	6.2	6.1	6.0	25.3	26.3	28.5
Malta	:	4.8	2.8	:	27.8	31.2
Netherlands	3.8	3.2	2.6	36.4	40.0	42.3
Austria	4.7	4.7	5.5	26.5	29.3	30.4
Poland	:	:	4.5	:	:	24.6
Portugal	3.6	3.1	2.7	21.8	19.4	22.7
Romania	:	4.6	5.4	:	11.0	14.5
Slovenia	7.7	7.9	7.5	20.8	23.0	26.3
Slovakia	:	5.8	8.0	:	25.3	24.9
Finland	5.3	5.3	4.7	37.4	39.1	41.1
Sweden (1)	6.4	6.0	5.4	44.2	46.1	47.5
United Kingdom	6.2	5.6	4.5	37.3	40.5	43.0
Croatia	:	:	4.4	:	:	22.1
Iceland	1.4	1.7	:	38.4	40.9	:
Norway	4.9	3.5	3.9	40.6	43.6	46.2
Switzerland	5.6	5.5	:	34.0	37.7	:

(1) Break in series, 2001.

Source: Eurostat (tsc00011 and tsc00012)

The data shows per country the employment in high- and medium-high technology manufacturing sectors as a share of total employment. Data source is the EU Labour Force Survey (LFS). The definition of high- and medium-high technology manufacturing sectors is based on the OECD definition (itself based on the ratio of R&D expenditure to GDP). The data shows per country the employment in knowledge-intensive service sectors as a share of total employment. Data source is the EU Labour Force Survey (LFS). The definition of knowledge-intensive services including high-technology services used by Eurostat is based on a selection of relevant items of NACE Rev. 1 on 2-digit level and is oriented on the ratio of highly qualified working in these areas.

12.2 EXPENDITURE

INTRODUCTION

Research and development (R & D) lies at the heart of the EU's strategy to become the most competitive and dynamic knowledge-based economy by 2010; one of the goals set in Lisbon was for the EU to increase its R & D expenditure to at least 3 % of GDP by 2010.

In January 2006 the European Commission presented to the European Council its 2006 annual report on the revised Lisbon strategy, in the form of a communication – COM(2006) 30 – entitled 'Time to move up a gear – The new partnership for growth and jobs' (114). One of the four areas for priority actions set out by the European Commission was to invest more in knowledge and innovation, and to increase the proportion of national wealth devoted to research and development between now and 2010.

One are that has received notable attention in recent years is the structural difference in R & D funding between Europe and its main competitors. One of the main goals of policy makers has been to increase the R & D business expenditure so that it is more in line with the ratios observed in Japan or the United States. In October 2007 the EU industrial R & D investment scoreboard was released (115). This presents information on the top 1 000 companies in terms of R & D investors whose registered offices are in the EU. The report shows that R & D investment by EU companies was growing at a slower rate than for their non-EU counterparts, a difference that is primarily explained by higher growth and more concentration of investment in R & D-intensive sectors outside the EU. The report pointed to rapid growth in R & D investment in the area of pharmaceuticals and biotechnology, and more generally for the whole of the chemicals sector, as well as aerospace and defence activities. Three EU companies were among the world's top ten R & D investors, namely: DaimlerChrysler, GlaxoSmithKline and Siemens.

(114) For more information: http://eur-lex.europa.eu/LexUriServ/site/en/com/2006/com2006_0030en01.pdf.

(115) For more information: http://iri.jrc.ec.europa.eu/.

DEFINITION AND DATA AVAILABILITY

R & D is defined as comprising creative work undertaken on a systematic basis to increase the stock of knowledge (of man, culture and society) and the use of this stock to devise new applications. R & D is an activity where there are significant transfers of resources between units, organisations and sectors.

R & D expenditure is a basic measure that covers intramural expenditure, in other words, all expenditures for R & D that are performed within a statistical unit or sector of the economy, whatever the source of the funds.

Gross domestic expenditure on R & D (often referred to as GERD) is composed of four separate sectors of performance: business enterprises, government, higher education, and private non-profit organisations. Expenditure data consider the research spend on the national territory, regardless of the source of funds; data are usually expressed in relation to GDP, otherwise known as R & D intensity.

Government budget appropriations or outlays for research and development (GBAORD) are the amount governments allocate towards R & D activities. Comparisons of GBAORD across countries give an impression of the relative importance attached to state-funded R & D.

MAIN FINDINGS

Gross domestic expenditure on R & D for the EU-27 followed a generally positive evolution in the five years up to 2002. However, in 2003 the share of R & D expenditure in GDP decreased – this pattern was repeated in 2004 and 2005.

Gross domestic expenditure on R & D in the EU-27 was equivalent to 1.84 % of GDP in 2005. As noted above, the EU-27's R & D expenditure tends to lag behind that of Japan and the United States as a result of differences observed in levels of expenditure within the business enterprise sector, where expenditure in the EU-27 was considerably lower (1.17 % of GDP in 2005).

Among the Member States, the highest R & D intensity was recorded in Sweden and Finland, the only Member States where R & D intensity exceeded the 3 % goal set by the Lisbon strategy. This level of intensity was exceeded in all years for which data is available over the period 1995-2005 in Sweden and the period 1998-2005 in Finland. There were 11 Member States for which data are available that reported that R & D expenditure accounted for less than 1 % of their GDP in 2005.

When focusing on the breakdown of gross domestic expenditure on R & D by source of funds in 2005, slightly more than half of the total (54.5 %) for the EU-27 came from the industrial sector, while just over one third (34.8 %) was derived from government, and a further 8.5 % came from abroad; industry-funded R & D accounted for about 70 % of R & D expenditure in Japan and the United States.

SOURCES

Statistical books

Science, technology and innovation in Europe

Pocketbooks

Science, technology and innovation in Europe – 2007 edition

Dedicated sections on the Eurostat website

R & D industrial investment scoreboard

Website data

Research and development

- Statistics on research and development
  - R & D expenditure at national and regional level
  - Scoreboard main indicators
- Government budget appropriations or outlays on R & D

Table 12.6: Gross domestic expenditure on R&D

(% of GDP)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
EU-27	:	:	:	*1.80*	*1.85*	*1.86*	*1.88*	*1.88*	*1.87*	*1.84*	*1.84*
Euro area	*1.79*	*1.73*	*1.77*	*1.79*	*1.83*	*1.85*	*1.87*	*1.88*	*1.87*	*1.86*	*1.86*
Belgium	1.67	1.77	1.83	1.86	1.94	1.97	2.08	1.94	1.89	*1.85*	*1.82*
Bulgaria (1, 2)	0.62	0.52	0.51	0.57	0.57	0.52	0.47	0.49	0.50	0.51	0.50
Czech Republic (3)	0.95	0.97	1.08	1.15	1.14	1.21	1.20	1.20	1.25	1.26	1.42
Denmark	1.82	*1.84*	1.92	2.04	2.18	2.24	2.39	2.51	2.56	*2.48*	*2.44*
Germany	*2.19*	*2.19*	2.24	2.27	2.40	2.45	2.46	2.49	2.52	2.50	*2.51*
Estonia	:	:	:	0.58	0.70	0.61	0.71	0.72	0.79	0.88	*0.94*
Ireland	*1.26*	*1.30*	*1.27*	1.23	*1.18*	*1.23*	*1.10*	*1.10*	*1.16*	*1.21*	*1.25*
Greece (3)	0.49	:	0.51	:	0.67	:	0.64	:	0.63	*0.61*	*0.61*
Spain	0.79	*0.81*	0.80	0.87	0.86	0.91	0.91	0.99	1.05	1.06	*1.12*
France (4, 5)	2.29	2.27	2.19	2.14	2.16	2.15	2.20	2.23	2.17	2.14	*2.13*
Italy (4)	0.97	0.99	1.03	1.05	1.02	1.05	1.09	1.13	1.11	1.10	:
Cyprus	:	:	:	0.22	0.23	0.24	0.25	0.30	0.35	0.37	*0.40*
Latvia	0.47	0.42	0.38	0.40	0.36	0.44	0.41	0.42	0.38	0.42	0.57
Lithuania (1)	0.44	0.50	0.54	0.55	0.50	0.59	0.67	0.66	0.67	0.76	0.76
Luxembourg	:	:	:	:	:	1.65	:	:	1.66	1.66	*1.56*
Hungary	0.73	0.65	0.72	0.68	0.69	0.78	0.92	1.00	0.93	0.88	0.94
Malta (6)	:	:	:	:	:	:	:	0.26	0.26	0.63	*0.61*
Netherlands (1)	1.97	1.98	1.99	1.90	1.96	1.82	1.80	1.72	1.76	*1.78*	:
Austria	*1.54*	*1.59*	*1.69*	1.77	*1.88*	*1.91*	*2.04*	2.12	*2.21*	2.23	*2.36*
Poland (3)	0.63	0.65	0.65	0.67	0.69	0.64	0.62	0.56	0.54	0.56	0.57
Portugal	0.54	*0.57*	0.59	0.65	0.71	*0.76*	0.80	*0.76*	0.74	*0.77*	*0.81*
Romania	:	:	:	0.49	0.40	0.37	0.39	0.38	0.39	0.39	:
Slovenia	1.57	1.33	1.31	1.37	1.41	1.43	1.55	1.52	1.32	1.45	*1.22*
Slovakia (4)	0.92	0.90	1.07	0.78	0.65	0.65	0.63	0.57	0.58	0.51	0.51
Finland	2.26	*2.52*	2.70	2.86	3.16	3.34	3.30	3.36	3.43	3.46	3.48
Sweden (3)	3.32	:	3.51	*3.59*	3.62	:	4.25	:	3.95	:	3.86
United Kingdom	1.95	1.87	1.81	1.80	1.87	1.86	1.83	1.83	1.79	1.73	:
Croatia	:	:	:	:	:	:	:	1.11	1.11	1.22	:
Turkey	0.38	0.45	0.49	0.50	0.63	0.64	0.72	0.66	:	:	:
Iceland	1.53	:	1.83	2.01	2.31	*2.69*	2.98	*2.99*	2.86	2.83	:
Norway (3)	1.70	:	1.64	:	1.65	:	1.60	1.67	1.73	1.62	*1.51*
Switzerland	:	2.67	:	:	:	2.57	:	:	:	2.93	:
Japan (1)	2.92	2.82	2.89	3.02	3.04	3.05	3.13	3.18	3.20	:	:
United States (7)	2.49	2.53	2.56	2.61	2.65	2.73	2.74	2.64	*2.67*	*2.67*	:

(1) Break in series, 1996.
(2) Break in series, 1999.
(3) Break in series, 1995.
(4) Break in series, 1997.
(5) Break in series, 2000.
(6) Break in series, 2004.
(7) Break in series, 1998.

Source: Eurostat (tsiir021), OECD

Research and experimental development (R&D) comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society and the use of this stock of knowledge to devise new applications (Frascati Manual, 2002 edition, § 63). R&D is an activity where there are significant transfers of resources between units, organisations and sectors and it is important to trace the flow of R&D funds.

Table 12.7: Gross domestic expenditure on R&D by sector

(% of GDP)

	Business enterprise sector		Government sector		Higher education sector	
	2000	2005	2000	2005	2000	2005
EU-27	*1.21*	*1.17*	*0.26*	*0.24*	*0.39*	*0.41*
Euro area	*1.19*	*1.18*	*0.27*	*0.26*	*0.38*	*0.40*
Belgium	1.43	*1.24*	0.12	*0.14*	0.40	*0.41*
Bulgaria	0.11	0.11	0.36	0.33	0.05	0.05
Czech Republic	0.73	0.92	0.31	0.27	0.17	0.23
Denmark	1.50	*1.67*	0.28	*0.18*	0.44	*0.58*
Germany	1.73	*1.76*	0.33	*0.34*	0.40	*0.42*
Estonia	0.14	*0.42*	0.14	0.11	0.32	0.39
Ireland	0.86	*0.82*	0.10	*0.08*	*0.27*	*0.35*
Greece	0.16	*0.18*	:	*0.13*	:	*0.30*
Spain	0.49	*0.61*	0.14	*0.19*	0.27	*0.32*
France (1, 2)	1.34	*1.32*	0.37	*0.37*	0.40	*0.42*
Italy	0.52	*0.55*	0.20	*0.17*	0.32	:
Cyprus	0.05	*0.09*	0.11	*0.13*	0.06	*0.15*
Latvia	0.18	0.23	0.10	0.11	0.17	0.23
Lithuania	0.13	0.16	0.25	0.19	0.22	0.42
Luxembourg	1.53	*1.34*	0.12	*0.19*	0.00	*0.02*
Hungary	0.35	0.41	0.20	0.26	0.19	0.24
Malta	:	*0.42*	:	0.02	:	0.17
Netherlands (1, 2)	1.07	*1.02*	0.23	*0.24*	0.51	:
Austria	:	*1.60*	:	*0.12*	:	*0.63*
Poland	0.23	0.18	0.21	0.21	0.20	0.18
Portugal	*0.21*	*0.29*	*0.18*	*0.11*	*0.28*	*0.32*
Romania	0.26	:	0.07	:	0.04	:
Slovenia	0.80	*0.87*	0.37	*0.23*	0.24	*0.12*
Slovakia	0.43	0.25	0.16	0.15	0.06	0.10
Finland	2.37	2.46	0.35	0.33	0.60	0.66
Sweden	:	2.92	:	0.12	:	0.80
United Kingdom	1.21	:	0.23	:	0.38	:
Turkey	0.21	:	0.04	:	0.39	:
Iceland	*1.51*	:	*0.69*	:	*0.44*	:
Norway	:	*0.82*	:	*0.24*	:	*0.45*
Switzerland (1)	1.90	:	0.03	:	0.59	:
Japan	2.17	:	0.30	:	0.44	:
United States	2.04	:	0.28	:	0.31	:

(1) Break in series, government sector for 2000.
(2) Break in series, higher education sector for 2000.

Source: Eurostat (tsc00001), OECD

R&D expenditures include all expenditures for R&D performed within the business enterprise sector (BERD) on the national territory during a given period, regardless of the source of funds. R&D expenditure in BERD are shown as a percentage of GDP (R&D intensity).

Table 12.8: Gross domestic expenditure on R&D by source of funds

(% of total gross expenditure on R&D)

	Industry		Government		Abroad		Others	
	2000	2005	2000	2005	2000	2005	2000	2005
EU-27	*56.3*	*54.5*	*34.3*	*34.8*	*7.3*	*8.5*	*2.1*	*2.2*
Euro area	*57.4*	*56.2*	*35.7*	*36.1*	*5.6*	*6.4*	*1.3*	*1.3*
Belgium	62.4	:	22.9	:	12.2	:	2.5	:
Bulgaria	24.4	:	69.2	:	5.3	:	1.1	:
Czech Republic	51.2	54.1	44.5	40.9	3.1	4.0	1.2	1.0
Denmark	:	:	:	:	:	:	:	:
Germany	66.0	:	*31.4*	:	2.1	:	*0.5*	:
Estonia	24.2	:	59.2	:	12.7	:	3.9	:
Ireland	*66.7*	*58.7*	*25.6*	*32.9*	*6.0*	*6.6*	*1.7*	*1.8*
Greece	:	:	:	:	:	:	:	:
Spain	49.7	:	38.6	:	4.9	:	6.8	:
France (1)	52.5	:	38.7	:	7.2	:	1.6	:
Italy	:	:	:	:	:	:	:	:
Cyprus	17.5	:	66.5	:	9.4	:	6.6	:
Latvia	29.4	34.3	41.5	46.0	29.1	18.5	0.0	1.2
Lithuania	31.6	20.8	61.7	62.7	6.7	10.5	0.0	6.0
Luxembourg	90.7	:	7.7	:	1.6	:	0.0	:
Hungary	37.8	39.4	49.5	49.4	10.6	10.7	2.1	0.5
Malta	:	:	:	:	:	:	:	:
Netherlands	51.4	:	34.2	:	11.6	:	2.8	:
Austria	*41.8*	*45.7*	*38.0*	*36.4*	*19.9*	*17.6*	*0.3*	*0.3*
Poland	29.5	30.3	66.5	60.7	1.8	5.7	2.2	3.3
Portugal	*27.0*	:	*64.8*	:	*5.2*	:	*3.0*	:
Romania	49.0	:	40.8	:	4.9	:	5.3	:
Slovenia	53.3	*65.2*	40.0	27.2	6.2	6.8	0.5	*0.8*
Slovakia	54.4	36.6	42.6	57.0	2.3	6.0	0.7	0.4
Finland	70.2	:	26.2	:	2.7	:	0.9	:
Sweden	:	:	:	:	:	:	:	:
United Kingdom	48.3	:	30.2	:	16.0	:	5.5	:
Turkey	42.9	:	50.6	:	1.2	:	5.3	:
Switzerland	69.1	:	23.2	:	4.3	:	3.4	:
Japan	72.4	:	*19.6*	:	0.4	:	*7.6*	:
United States	68.6	:	25.8	:	:	:	:	:

(1) Break in series, 2000.

Source: Eurostat (tsiir022, tsiir023 and tsiir024), OECD

12.3 INNOVATION

INTRODUCTION

By placing competitiveness at the heart of the European political agenda, the reinvigorated Lisbon process aims to make Europe a more attractive place to invest, by boosting entrepreneurial initiative and creating a productive environment where innovation capacity can grow and develop. With this in mind, on 29 October 2006, the European Parliament and the Council adopted a decision (n° 1639/2006/CE) establishing a competitiveness and innovation framework programme (CIP) for the period 2007-2013 (116).

Education is seen as a key to developing an innovation-orientated society, through developing entrepreneurial skills, as well as literacy, scientific and mathematical competence, languages and digital literacy. Many policy makers express concern at the falling number of science and technology graduates and a lack of mobility between universities and industry.

Another element that is often considered as being important for the development of an innovative society is the regulatory environment. More specifically, the success of innovation is considered by many to depend on the rapid adoption of new technological standards and the protection of intellectual property. Policy developments in this field include a European Commission proposal for the adoption of a Community-wide patent system (see next subchapter), while Directive 2004/48/EC of the European Parliament and of the Council covers the enforcement of intellectual property rights (117); this is in the process of being revised and has reached the stage of an amended European Commission proposal for a Directive of the European Parliament and of the Council on criminal measures aimed at ensuring the enforcement of intellectual property rights.

(116) For more information: ftp://ftp.cordis.europa.eu/pub/innovation/docs/cip_en.pdf.

(117) For more information: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32004L0048R(01):EN:HTML.

DEFINITION AND DATA AVAILABILITY

The fourth Community Innovation Survey (CIS4) collects information about both product and process innovation and organisational and marketing innovation. The legal basis for the collection of these statistics is a Commission Regulation (EC) No 1450/2004 of 13 August 2004 implementing Decision No 1608/2003/EC of the European Parliament and of the Council concerning the production and development of Community statistics on innovation (118).

The survey covers areas such as new or significantly improved goods or services and the introduction of new or significantly improved processes, logistics or distribution methods. It also provides information on the characteristics of innovation activity at the enterprise level, thus creating a better understanding of the innovation process and the effects of innovation on the economy.

For the purpose of the Community Innovation Survey (CIS) an innovation is defined as a new or significantly improved product (good or service) introduced to the market, or the introduction within an enterprise of a new or significantly improved process. Innovations are based on the results of new technological developments, new combinations of existing technology, or the utilisation of other knowledge acquired by the enterprise. Innovations may be developed by the innovating enterprise or by another enterprise. However, purely selling innovations wholly produced and developed by other enterprises is not included as an innovation activity, nor is introducing products with purely aesthetic changes. Innovations should be new to the enterprise concerned: for product innovations they do not necessarily have to be new to the market and for process innovations the enterprise does not necessarily have to be the first one to have introduced the process.

Enterprises with innovation activity include all types of innovator, namely product innovators, process innovators, as well as enterprises with only on-going and/or abandoned innovation activities. The proportion of enterprises with innovation activity may also be referred to as the propensity to innovate.

In terms of comparability of data between the different surveys, Eurostat made particular improvements for comparison between the third and fourth innovation surveys, which were based on similar survey methodology, target populations, survey questionnaires and definitions of innovation. CIS4 was carried out in all EU-27 Member States, as well as Iceland and Norway. Data is also available broken down by enterprise size class.

(118) For more information: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32004R1450:EN:HTML.

MAIN FINDINGS

According to CIS4, the proportion of enterprises with innovation activity increased slightly in relation to the results from CIS3. Some 40 % of the EU-27's enterprises were innovative in 2004, compared with a share of 39 % in 2000. This slight increase in innovation activity was reflected in the vast majority of countries, with Ireland, Cyprus, Finland, Portugal, the Netherlands, France, Hungary, Latvia and Iceland the only exceptions reporting a lower propensity to innovate in 2004.

Germany had the highest propensity to innovate in 2004, with more than two thirds of all enterprises having some form of innovation activity. At the other end of the spectrum, Bulgaria, Latvia and Romania each reported that fewer than one in five enterprises were engaged in innovative activities.

A breakdown by enterprise size class shows that large (250 and more employees) enterprises were more inclined to introduce new or improved products to the market. Almost half of all large innovative enterprises did so in the EU-27 in 2004, compared with less than 40 % of medium-sized (from 50 to 249 employees) enterprises and only around one third of small (from 10 to 49 employees) enterprises.

New or significantly improved products contributed a relatively small share of total turnover among innovative enterprises in 2004, below the threshold of 10 % in most Member States; these products did however account for more than 20 % of sales in Malta and Slovakia.

SOURCES

Statistical books

Science, technology and innovation in Europe
Innovation in Europe – results for the EU, Iceland and Norway

Pocketbooks

Science, technology and innovation in Europe – 2007 edition

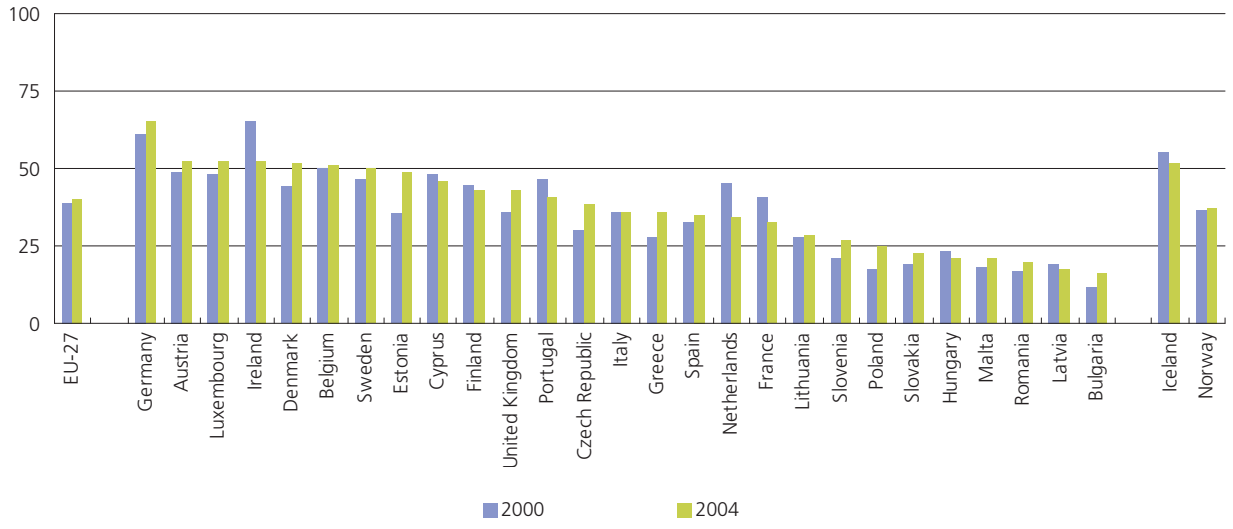
Website data

Community innovation survey

Results of the fourth community innovation survey (CIS4)

Figure 12.6: Proportion of innovative enterprises

(% of all enterprises)



Source: Eurostat (inn_prod and inn_cis4_prod)

Table 12.9: Proportion of innovative enterprises which introduced new or improved products to the market, by size of enterprise

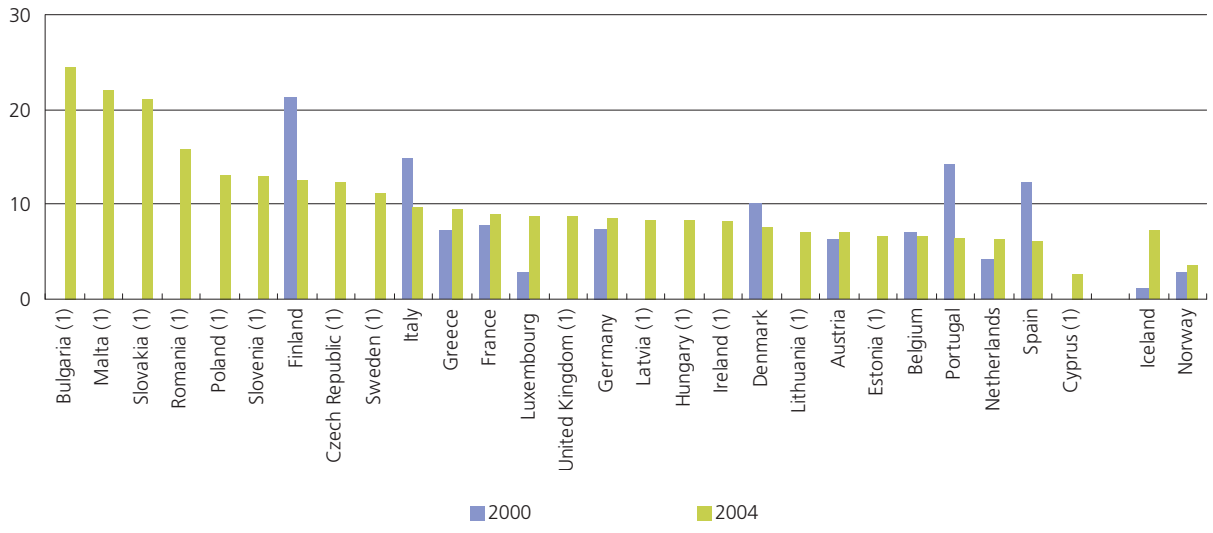
(% of innovative enterprises)

	2000				2004			
	Total	10 to 49 employees	50 to 249 employees	> 250 employees	Total	10 to 49 employees	50 to 249 employees	> 250 employees
EU-27	38.4	36.5	39.9	49.3	35.9	33.2	39.6	49.2
Belgium	36.1	32.3	42.2	52.3	40.7	38.5	44.0	53.1
Bulgaria	53.6	53.3	52.5	59.5	56.4	57.6	52.9	58.6
Czech Republic	38.2	35.2	41.2	46.3	41.5	39.0	44.4	48.3
Denmark	50.9	45.2	62.7	66.7	47.7	46.2	49.3	58.0
Germany	30.5	26.8	33.5	45.2	26.9	22.7	31.7	42.1
Estonia	38.6	39.0	35.7	45.0	41.9	43.7	35.4	44.7
Ireland	31.7	:	:	:	44.5	38.0	57.2	62.8
Greece	40.1	40.3	38.7	44.3	44.4	43.3	47.6	54.2
Spain	34.0	33.1	34.8	45.2	20.9	18.0	28.2	43.2
France	34.7	28.3	37.7	49.0	38.6	34.1	43.3	57.9
Italy	54.7	53.1	60.5	64.7	31.1	28.7	37.8	52.2
Cyprus	13.5	11.0	20.8	24.1	14.6	11.6	21.7	40.9
Latvia	44.8	43.8	46.5	45.6	34.5	33.8	36.4	34.1
Lithuania	46.0	45.5	46.8	47.0	34.5	30.9	38.4	43.8
Luxembourg	39.9	:	28.5	:	51.6	51.4	48.8	64.2
Hungary	35.4	38.5	23.5	39.0	36.3	36.5	33.9	40.7
Malta	53.7	56.3	56.1	35.0	25.0	25.0	25.0	25.0
Netherlands	41.8	39.8	43.4	51.8	48.3	47.5	48.3	56.8
Austria	28.3	19.8	35.4	62.5	48.4	47.3	47.1	64.7
Poland	:	:	:	:	46.4	44.8	47.6	50.4
Portugal	43.4	39.2	48.6	70.0	30.1	27.3	35.8	44.6
Romania	80.4	81.4	79.0	80.1	27.9	25.1	29.2	36.2
Slovenia	60.7	67.4	56.4	57.1	46.6	40.8	50.1	58.1
Slovakia	41.5	36.5	46.3	49.1	41.6	39.7	42.6	45.1
Finland	62.7	62.3	62.7	64.9	49.6	47.4	52.2	58.0
Sweden	37.0	39.5	26.9	43.9	52.4	52.8	49.9	56.5
United Kingdom	27.5	26.7	27.8	33.3	47.8	47.3	48.2	51.9
Iceland	21.1	19.8	22.8	32.0	77.6	82.4	59.6	89.5
Norway	38.5	39.6	33.4	41.6	36.5	37.6	32.5	38.6

Source: Eurostat (inn_prod and inn_cis4_prod)

Figure 12.7: Turnover from new or significantly improved products, new to the market

(% of total turnover of innovative enterprises)



(1) Not available for 2000.

Source: Eurostat (inn_prod and inn_cis4_prod)

12.4 PATENTS

INTRODUCTION

Intellectual property rights provide a link between innovation, inventions and the marketplace. Applying for a patent, for example, makes an invention public but at the same time gives it protection. A count of patents is one measure that reflects a country's inventive activity and also shows its capacity to exploit knowledge and translate it into potential economic gains. In this context, indicators based on patent statistics are widely used to assess the inventive and innovative performance of a country.

Patents are generally used to protect R & D results, but they are also significant as a source of technical information, which may prevent re-inventing and re-developing ideas because of a lack of information. However, the use of patents is relatively restricted within the EU – this may be for a number of reasons including their relative cost, the overlap between national and European procedures, or the need for translation into foreign languages.

Most studies in this area show that innovative enterprises tend to make more use of intellectual property protection. Enterprise size and the economic sector in which an enterprise operates are also likely to play an important role in determining whether an enterprise chooses to protect its intellectual property.

In April 2007 the European Commission released a Communication entitled, 'Enhancing the patent system in Europe' (119). It highlighted that the European patent system is more expensive, uncertain and unattractive, while underlining that the European Commission believes a more competitive and attractive Community patent system can be achieved, based upon the creation of a unified and specialised patent judiciary, with competence for litigation on European patents and future Community patents.

DEFINITION AND DATA AVAILABILITY

Patent data published in this section are provided by the European Patent Office (EPO), while data for the United States Patent and Trademark Office (USPTO) are provided by the OECD.

(119) COM(2007) 165 final; for more information: http://eur-lex.europa.eu/LexUriServ/site/en/com/2007/com2007_0165en01.pdf.

European patent applications refer to applications filed directly under the European Patent Convention or to applications filed under the Patent Co-operation Treaty and designated to the EPO (Euro-PCT), regardless of whether the patents are granted or not. Applications are assigned to a country according to the inventor's place of residence, using fractional counting if there are multiple inventors to avoid double counting. To normalise the data, the total number of applications at the EPO is also divided by the population and expressed as applications per million. The European Patent Office (EPO) grants European patents for the contracting states to the European Patent Convention (EPC). There are currently 32 contracting states; the EU-27 Member States, Iceland, Liechtenstein, Switzerland, Monaco and Turkey.

In contrast, the United States Patent and Trademark Office (USPTO) data refers to patents granted and data are recorded by year of publication as opposed to the year of filing. Patents are allocated to the country of the inventor, using fractional counting in the case of multiple inventor countries. The methodology used is not harmonised with that of Eurostat and therefore the comparison between EPO and USPTO patents data should be interpreted with caution.

MAIN FINDINGS

EU-27 patent applications to the EPO increased significantly from 1995 onwards, when the number of applications increased on average by 11.6 % per annum through to 2000. However, the steady upward trend reached a peak of 61 300 patent applications in 2001, followed by a slight decline in 2002, and then another increase in 2003 (to 62 300 applications). EU-27 high-tech patent applications to the EPO represented an increasing share of total patent applications up until 2001, after which their relative importance declined somewhat. Patent applications to the EPO from the United States numbered almost 48 800 in 2003, while the level of applications from Japan was almost 28 000.

Among the Member States, Germany had by far the highest number of patent applications to the EPO, some 25 700 in 2003 (which was more than 40 % of the EU-27 total). In relative terms, Germany was also the Member State with the highest number of patent applications per million inhabitants (312), followed by Finland (306) and then Sweden (285); although these rates were below those recorded in Liechtenstein and Switzerland (respectively 726 and 426 applications to the EPO per million inhabitants in 2003).

Finland stood out as the Member State that was most specialised in high-technology patent applications, as these accounted for 41 % of all Finish patent applications to the EPO in 2003. The ratio of high-technology patent applications per million inhabitants in Finland stood at 126 (slightly more than twice the rate in Sweden, which was the next highest figure among the Member States).

SOURCES

Statistical books

Science, technology and innovation in Europe

Pocketbooks

Science, technology and innovation in Europe – 2007 edition

Methodologies and working papers

OECD patent manual

Data production methods for harmonised patent statistics: patentee name harmonisation

Data production methods for harmonised patent statistics: assignee sector allocation

Website data

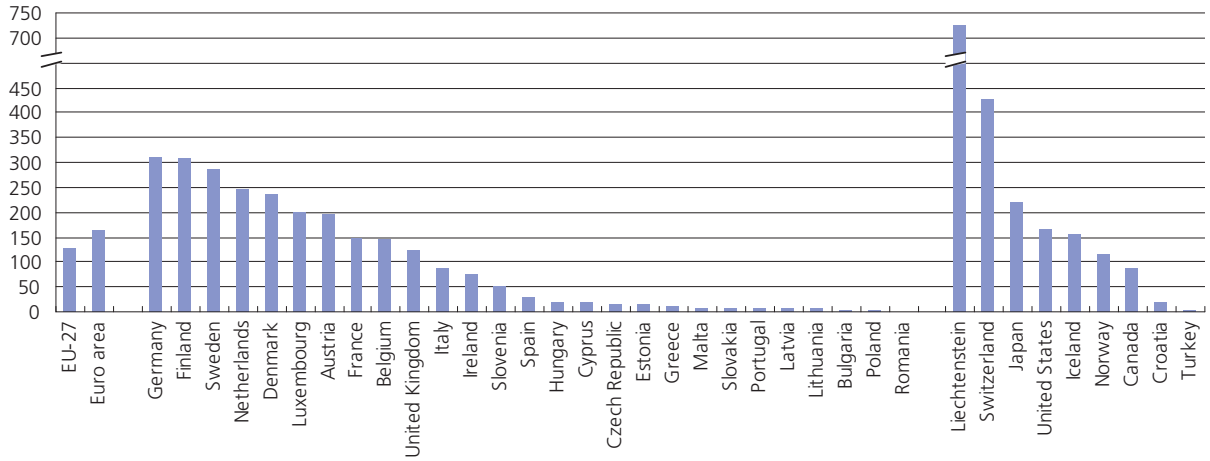
Patent statistics

Patent applications to the EPO by priority year

Patents granted by the USPTO by priority year

Figure 12.8: Patent applications to the European Patent Office (EPO), 2003

(number of applications per million inhabitants)



Source: Eurostat (tsiir051), European Patent Office

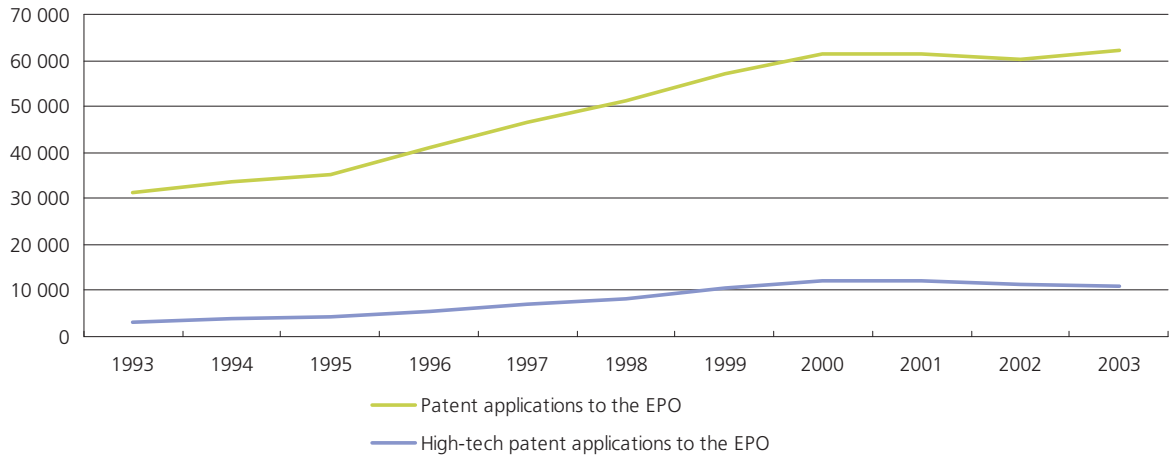
Table 12.10: Patent applications to the European Patent Office (EPO) and patents granted by the USPTO

	Patent applications to the EPO				High technology patent applications to the EPO				Patents granted by the United States Patent and Trademark Office (USPTO)			
	(number of applications)		(number of applications per million inhabitants)		(number of applications)		(number of applications per million inhabitants)		(number of patents granted)		(number of applications per million inhabitants)	
	1998	2003	1998	2003	1998	2003	1998	2003	1995	2000	1995	2000
EU-27	51 194	62 250	107	128	8 392	10 840	17	22	23 089	23 723	48.5	49.2
Euro area	40 876	50 528	134	163	6 242	8 414	20	27	17 937	18 987	59.7	62.0
Belgium	1 313	1 496	129	144	221	242	22	23	626	550	61.8	53.8
Bulgaria	24	34	3	4	2	3	0	0	6	4	0.7	0.5
Czech Republic	101	163	10	16	11	10	1	1	26	28	2.6	2.8
Denmark	944	1 270	178	236	175	246	33	46	372	382	71.4	71.6
Germany	21 629	25 728	264	312	2 770	3 635	34	44	9 368	10 509	114.9	127.9
Estonia	7	21	5	16	2	8	1	6	2	1	1.4	0.7
Ireland	226	306	61	77	48	63	13	16	91	145	25.3	38.5
Greece	80	123	7	11	5	21	0	2	13	14	1.2	1.3
Spain	830	1 274	21	31	94	165	2	4	230	288	5.9	7.2
France	7 433	9 202	124	149	1 363	1 980	23	32	3 752	3 235	63.3	53.5
Italy	3 711	5 002	65	87	325	481	6	8	1 489	1 694	26.2	29.8
Cyprus	7	12	10	16	:	4	:	5	0	1	0.3	1.7
Latvia	10	14	4	6	1	1	0	0	2	6	0.9	2.5
Lithuania	1	20	0	6	:	2	:	1	0	6	0.1	1.8
Luxembourg	80	90	190	200	5	6	12	14	25	36	62.3	83.4
Hungary	120	192	12	19	17	34	2	3	55	54	5.3	5.3
Malta	5	4	13	9	:	:	:	:	:	2	:	5.3
Netherlands	2 941	3 956	188	244	744	908	48	56	1 235	1 307	80.1	82.4
Austria	1 070	1 581	134	195	95	235	12	29	446	556	56.2	69.5
Poland	61	160	2	4	7	23	0	1	8	20	0.2	0.5
Portugal	32	78	3	7	2	15	0	1	10	14	1.0	1.4
Romania	26	26	1	1	1	3	0	0	6	3	0.3	0.1
Slovenia	50	101	25	50	4	9	2	4	16	24	8.2	11.9
Slovakia	23	44	4	8	3	5	1	1	6	7	1.1	1.3
Finland	1 481	1 591	288	306	565	654	110	126	634	614	124.3	118.8
Sweden	2 622	2 547	296	285	596	562	67	63	1 291	1 172	146.4	132.2
United Kingdom	6 368	7 217	109	121	1 335	1 526	23	26	3 377	3 050	58.3	51.9
Croatia	31	81	7	18	2	4	0	1	13	14	2.7	3.1
Turkey	53	133	:	2	6	13	:	0	7	12	:	:
Iceland	36	44	133	154	9	15	32	53	10	20	37.5	70.0
Liechtenstein	43	25	1 357	726	1	2	32	59	13	10	409.1	313.6
Norway	511	533	116	117	45	90	10	20	214	203	49.3	45.3
Switzerland	2 635	3 113	371	426	263	331	37	45	1 298	1 253	184.9	174.9
Canada	1 931	2 736	63	86	516	793	17	25	2 739	3 216	93.0	104.8
Japan	17 243	27 987	137	219	4 228	6 834	34	54	29 641	35 013	236.0	276.0
United States	38 345	48 786	142	168	10 366	13 845	39	48	72 420	77 585	276.7	274.7

Source: Eurostat (tsc00009, tsiir051, pat_ep_ntec, tsc00010, pat_us_ntot and tsiir052), European Patent Office

Total European patent applications refer to requests for protection of an invention directed either directly to the European Patent Office (EPO) or filed under the Patent Cooperation Treaty and designating the EPO (Euro-PCT), regardless of whether they are granted or not. The data shows the total number of applications per country. Data refer to applications filed directly under the European Patent Convention or to applications filed under the Patent Co-operation Treaty and designated to the EPO (Euro-PCT). Patent applications are counted according to the year in which they were filed at the EPO and are broken down according to the International Patent Classification (IPC). They are also broken down according to the inventor's place of residence, using fractional counting if multiple inventors or IPC classes are provided to avoid double counting. The data refers to the ratio of patent applications made directly to the European Patent Office (EPO) or via the Patent Cooperation Treaty and designating the EPO (Euro-PCT), in the field of high-technology patents per million inhabitants of a country. The definition of high-technology patents uses specific subclasses of the International Patent Classification (IPC) as defined in the trilateral statistical report of the EPO, JPO and USPTO. USPTO data refers to patents granted while EPO data refers to patent applications. Data are recorded by year of publication as opposed to the year of filing used for the EPO data. This is because patents in the US (at least in the past) were only published once they were granted. Patents are allocated to the country of the inventor, using fractional counting in the case of multiple inventor countries. The methodology used is not harmonised with that of Eurostat and therefore the comparison between EPO and USPTO patents data should be interpreted with caution.

Figure 12.9: Patent applications to the European Patent Office (EPO), EU-27
(number of applications)



Source: Eurostat (tsc00009 and pat_ep_ntec), European Patent Office

12.5 INFORMATION SOCIETY

INTRODUCTION

Information and communication technologies (ICT) are considered as critical for improving the competitiveness of European industry and, more generally, to meet the demands of its society and economy.

The i2010 initiative [120] – European information society in 2010 – seeks to boost efficiency throughout the European economy through wider use of information and communications technologies. This policy covers regulation, research, deployment, and promoting cultural diversity. Its main objective is to ensure that Europe's citizens, businesses and governments make the best use of ICT, in order to improve competitiveness, support growth, and create jobs, as well as addressing key societal challenges. At the heart of the policy is a desire to ensure that social and geographical differences are overcome, thus creating an inclusive digital society. The i2010 initiative has three main priorities:

- to create a Single European Information Space, which promotes an open and competitive internal market for information society and media services;
- to strengthen investment in innovation and research in ICT, and
- to foster inclusion, better public services and quality of life through the use of ICT.

(120) For more information: http://ec.europa.eu/information_society/eeurope/i2010/index_en.htm.

Broadband technologies are considered to be of major importance when measuring access and use of the Internet as they offer users the possibility to rapidly transfer large volumes of data and keep their access line open; the take-up of broadband is considered a key indicator within the domain of ICT policy making. Widespread access to the Internet via broadband is seen as essential for the development of advanced services on the Internet, such as eBusiness, eGovernment or eLearning.

Broadband growth has continued in the last year throughout the EU, and the highest penetration rates show that roughly one third of all households has broadband. Digital Subscriber Line (DSL) remains the EU's main broadband technology, although alternatives such as cable, fibre optics, wireless local loops are seeing more widespread use.

DEFINITION AND DATA AVAILABILITY

Statisticians are well aware of the challenges posed by rapid technological change in areas related to the Internet and other new means of information and communication technology. As such, there has been a considerable degree of evolution in this area, with statistical tools being adapted to satisfy new demands for data. Statistics within this domain are re-assessed on an annual basis in order to meet user needs and reflect the rapid pace of technological change.

The data presented within this section are from Eurostat surveys on information and communication technologies in households and by individuals, and surveys on information and communication technologies in enterprises. These annual surveys on ICT use in enterprises and in households/by individuals can be used to benchmark ICT-driven developments. While the surveys initially concentrated on access and connectivity issues, their scope has subsequently been extended to cover a variety of socio-economic breakdowns, so that regional diversity, gender specificity, age and educational differences are also covered. The scope of the surveys with respect to different technologies is also adapted so as to cover new product groups and means of delivering communication technologies to end-users (enterprises and households).

Households are defined as having at least one member in the age group 16 to 74 years old. Internet access refers to whether anyone in a household could use the Internet at home, if desired, even if just to send an e-mail. The most commonly used technologies to access the Internet are divided between broadband and dial-up access. Broadband includes digital subscriber lines (DSL) and uses technology that transports data at high speeds. A dial-up access using a modem can be made over a normal or an ISDN telephone line. Due to its limited bandwidth it is often referred to as narrowband.

A computer is defined as a personal computer that is run using one of the main operating systems (Macintosh, Linux or Microsoft); handheld computers or palmtops (PDAs) are also included.

The ordering of goods and services by individuals includes confirmed reservations for accommodation, purchasing financial investments, participation in lotteries and betting, Internet auctions, as well as information services from the Internet that are directly paid for. Goods and services that are obtained via the Internet for free are excluded. Orders made by manually written e-mails are also excluded.

The survey on ICT usage in enterprises covers enterprises with 10 or more persons employed. Its activity coverage is restricted to those enterprises whose principal activity is within NACE Sections D, F, G, I and K and Groups 55.1, 55.2, 92.1 and 92.2, in other words manufacturing, construction, distributive trades, hotels and accommodation, transport and communication, real estate, renting and business activities, motion picture, video, radio and television activities.

The indicator measuring enterprise turnover from e-commerce is shown as a percentage of the total turnover. E-commerce is defined as ordering or selling goods and services over computer mediated networks. On-line purchases or orders received exclude those relating to manually typed e-mail purchases or orders received.

Indicators relating to online access to public services show the percentage of 20 selected basic services which are fully available online, in other words, for which it is possible to carry out full electronic case handling. Measurement is based on a sample of URLs of public websites agreed with Member States as relevant for each service.

The indicators concerning the use of e-government services are based on usage during the three months prior to the survey for individuals and one year in the case of enterprises. They concern interaction with public authorities in one or more of the following activities: obtaining information from public authority websites, downloading official forms and submitting completed forms.

Data on information technology (IT) expenditure covers expenditure for IT hardware, equipment, software and other services.

MAIN FINDINGS

During the last decade, information and communication technologies (ICTs) have become widely available to the general public, in terms of accessibility as well as cost. In 2006 almost half (49 %) of all households in the EU-27 had an Internet access, with more households using broadband access (30 %), when compared with those that used a dial-up access or ISDN (slightly less than 20 %).

Some 80% of individuals living in a household with broadband connection accessed the Internet at least once a week. Some 41 % of all individuals declared they accessed Internet at home in 2006; the equivalent proportion accessing the Internet from their place of work was 22 %.

Widespread and affordable broadband access would appear to be one means of promoting the knowledge based and informed society. Half of some 20 basic public services that were surveyed across the EU-27 were available online in 2006. Almost one quarter (24 %) of all individuals made use of these public services online, mainly for obtaining information.

Almost all (92 %) enterprises in the EU-27 had an Internet connection in 2006 and 73 % accessed the Internet using broadband connections. Almost two thirds (63 %) of enterprises made use of e-government services. A majority of enterprises used e-government services to obtain information and to download forms (55 % of all enterprises did both of these activities), while 44 % of enterprises returned filled in forms using e-government services.

Among the Member States there is a clear distinction between high levels of e-commerce take-up in some countries and low participation rates in others. The general pattern across Member States is one where a larger proportion of enterprises have made purchases online when compared with those that have received orders online (probably reflecting the greater complexity of setting up an online selling system compared with making purchases). Online purchases by enterprises were particularly important in Ireland, the United Kingdom and Germany, with about half of all enterprises purchasing goods or services online in 2006.

Compared with its main competitors, the EU has a relatively low share of ICT expenditure when expressed as a share of GDP. Indeed, expenditure on information technology represented 2.7% of GDP in the EU-27 in 2006, compared with 3.4 % in Japan and 3.3 % in the United States.

SOURCES

Statistical books

Science, technology and innovation in Europe

Pocketbooks

Science, technology and innovation in Europe – 2007 edition

Dedicated sections on the Eurostat website

Information society

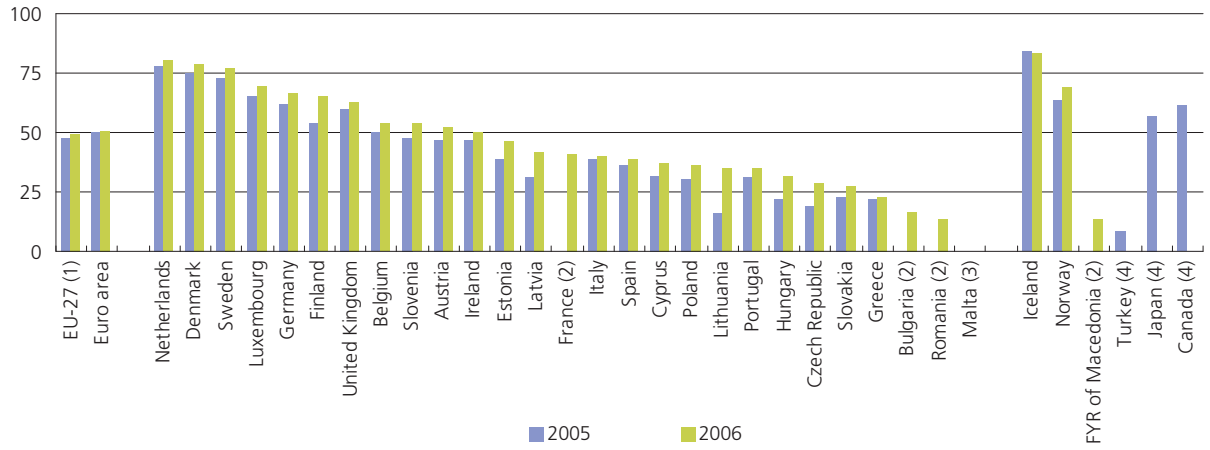
Website data

Information society statistics

- Policy indicators
- Information society: structural indicators
- Computers and the Internet in households and enterprises
- E-commerce by individuals and enterprises

Figure 12.10: Internet access of households

(% of all households)



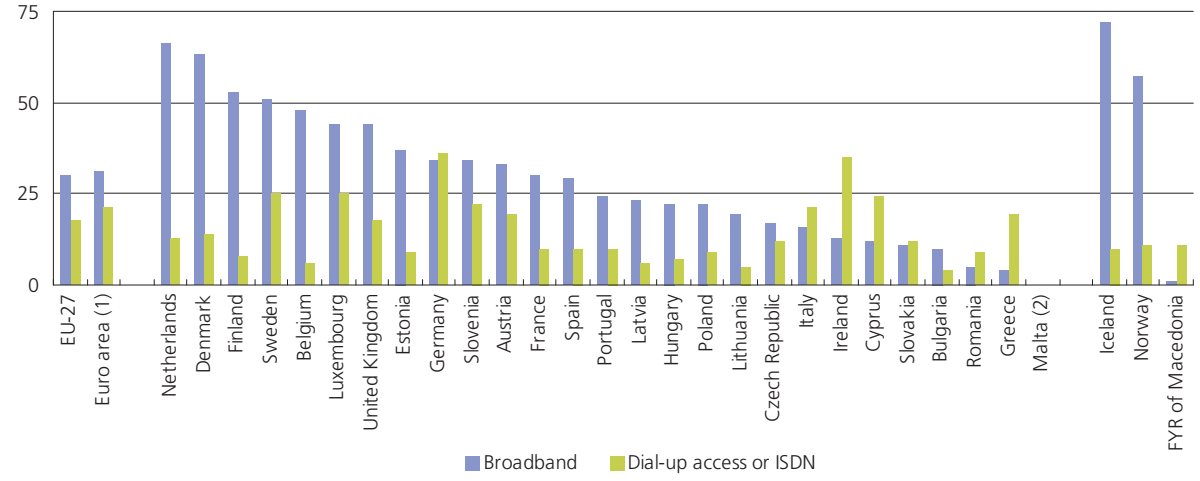
(1) EU-25 for 2005.
(2) Not available for 2005.
(3) Not available.
(4) Not available for 2006.

Source: Eurostat (tsiir031)

Percentage of households who have Internet access at home. All forms of Internet use are included. The population considered is aged 16 to 74.

Figure 12.11: Internet access of households by type of connection, 2006

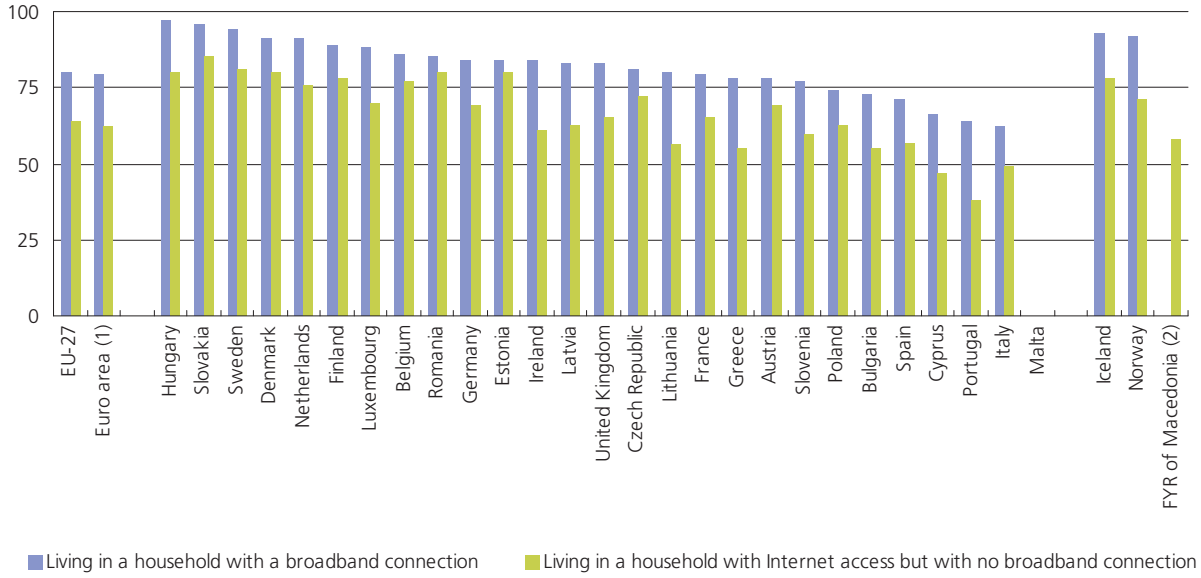
(% of all households)



(1) EA-12.
(2) Not available.
Source: Eurostat (isoc_ci_it_h)

Figure 12.12: Individuals regularly using the Internet by type of connection, 2006

(% of all individuals aged 16 to 74)



(1) EA-12.
(2) Broadband, not available.

Source: Eurostat (isoc_ci_ifp_fu)

Table 12.11: Place of Internet use by individuals, 2006

(% of individuals aged 16 to 74)

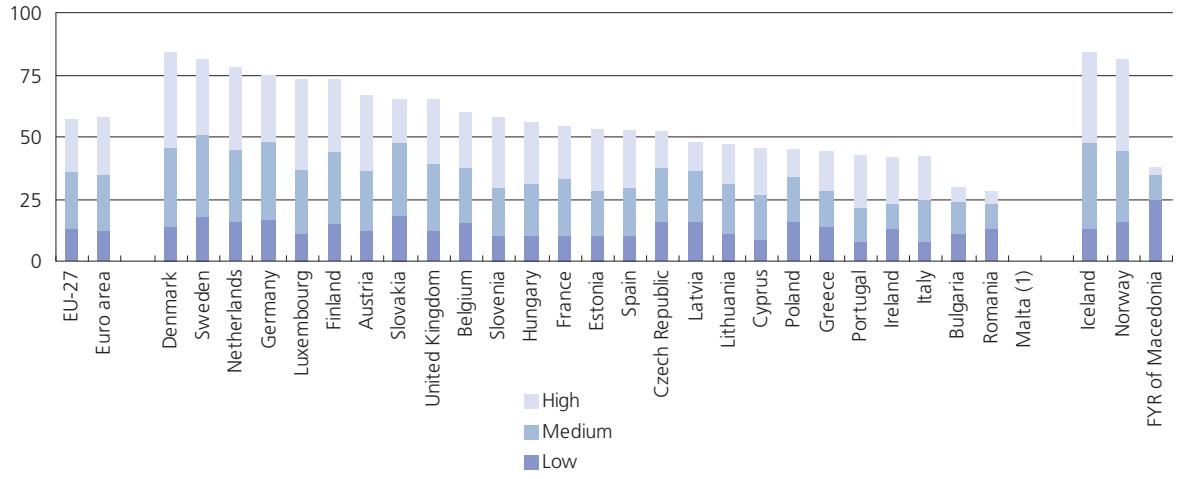
	Home	Place of work (other than home)	Place of education	Other places
EU-27	41	22	8	7
Euro area (1)	42	22	7	6
Belgium	53	21	6	3
Bulgaria	14	10	3	6
Czech Republic	31	20	9	3
Denmark	77	46	14	9
Germany	61	27	8	6
Estonia	46	28	11	4
Ireland	36	23	7	4
Greece	18	12	4	4
Spain	33	22	7	10
France	35	18	6	5
Italy	27	17	5	5
Cyprus	24	17	5	3
Latvia	31	22	9	9
Lithuania	29	17	11	7
Luxembourg	65	32	8	2
Hungary	29	19	12	7
Malta	:	:	:	:
Netherlands	77	39	9	3
Austria	47	29	6	3
Poland	26	13	10	6
Portugal	23	16	8	5
Romania	11	7	4	3
Slovenia	41	28	10	9
Slovakia	24	26	11	7
Finland	65	39	18	16
Sweden	77	38	12	5
United Kingdom	55	30	10	14
FYR of Macedonia	8	4	5	14
Iceland	80	49	20	15
Norway	73	47	12	11

(1) EA-12.

Source: Eurostat (isoc_ci_ifp_pu)

Figure 12.13: Individuals' level of computer skills, 2006

(% of all individuals aged 16 to 74)



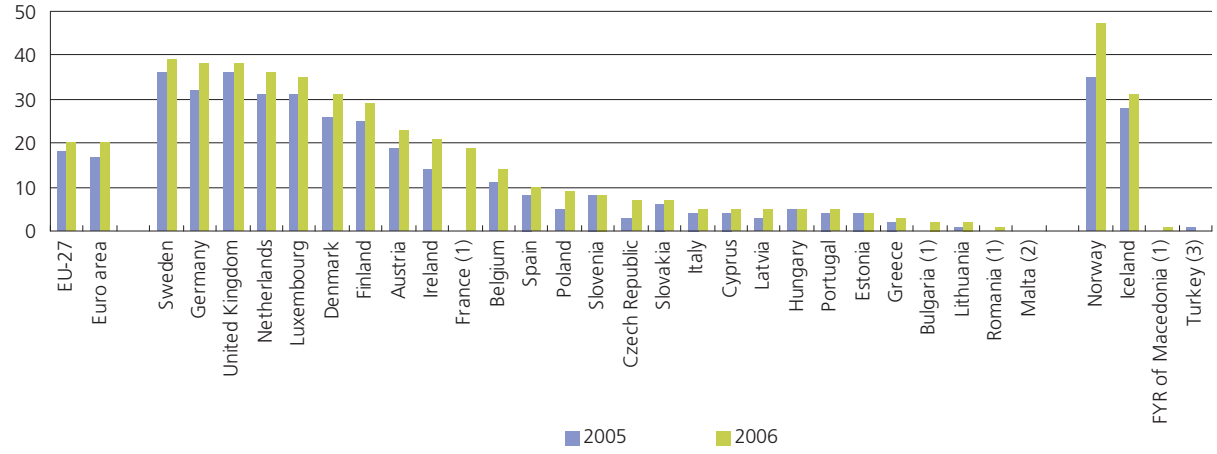
(1) Not available.

Source: Eurostat (tsc00039, tsc00040 and tsc00041)

This indicator presents the percentage of individuals who have carried out one or more of the following computer related activities: copied or moved a file or folder; used copy and paste tools to duplicate or move information within a document; used basic arithmetic formulas to add, subtract, multiply or divide figures in a spreadsheet; compressed files; connected and installed new devices, e.g. a printer or a modem; wrote a computer program using a specialised programming language.

Figure 12.14: Individuals who ordered goods or services over the Internet for private use in the last three months

(% of all individuals aged 16 to 74)



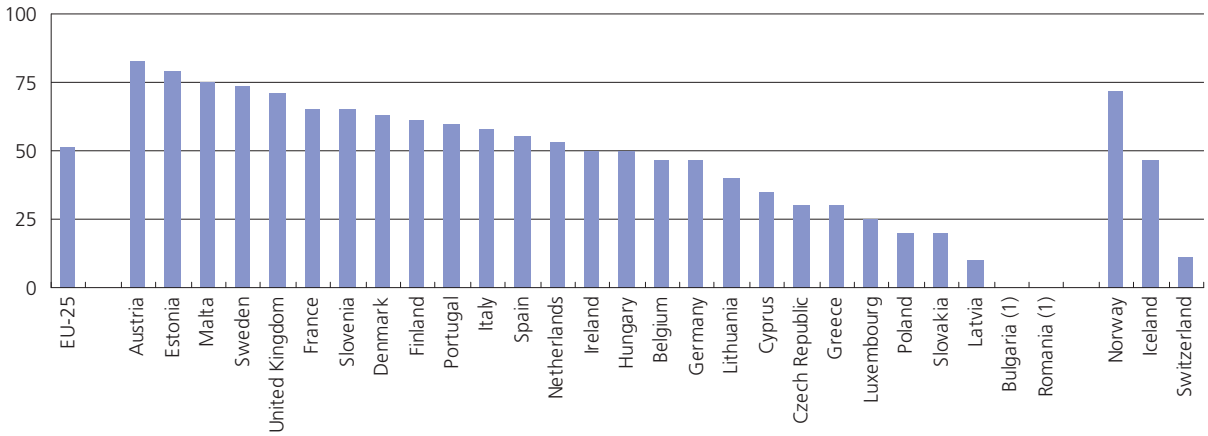
(1) Not available for 2005.
(2) Not available.
(3) Not available for 2006.

Source: Eurostat (tsc00021)

This indicator covers all individuals aged 16 to 74. Financial investments are excluded.

Figure 12.15: E-government on-line availability, 2006

(% of online availability of 20 basic public services)



(1) Not available.

Source: Eurostat (tsiir100), Directorate-General for Information Society and Media

The indicator shows the percentage of the 20 basic services which are fully available online i.e. for which it is possible to carry out full electronic case handling. For example if in a country 13 of the 20 services were measured as being 100 % available on-line and one service was not relevant (e.g. does not exist), the indicator is 13/19 which is 68.4 %. Measurement is based on a sample of URLs of public web sites agreed with Member States as relevant for each service.

Table 12.12: Individuals using the Internet for interacting with public authorities, 2006

(% of all individuals aged 16 to 74)

	E-government usage by individuals			Individuals using the Internet for interacting with public authorities		
	Total	Male	Female	Obtaining information	Downloading official forms	Returning filled in forms
EU-27	24	27	21	21	13	9
Euro area	27	30	24	24	15	10
Belgium	30	33	28	26	8	7
Bulgaria	8	9	8	6	4	2
Czech Republic	17	18	16	16	8	3
Denmark	43	50	36	39	20	17
Germany	32	36	29	28	18	9
Estonia	29	30	28	27	17	17
Ireland	26	27	24	21	19	14
Greece	9	10	7	6	1	2
Spain	25	28	22	24	14	7
France	26	28	24	24	14	12
Italy	16	19	13	15	11	5
Cyprus	13	13	12	12	8	3
Latvia	25	25	25	23	8	6
Lithuania	13	12	13	13	7	6
Luxembourg	46	57	35	36	35	17
Hungary	17	18	16	14	11	5
Malta	:	:	:	:	:	:
Netherlands	52	61	42	46	27	30
Austria	33	39	27	29	22	12
Poland (1)	13	13	12	11	6	3
Portugal	17	19	14	14	11	12
Romania	3	3	3	3	1	1
Slovenia	30	33	28	28	17	6
Slovakia	32	35	29	27	17	7
Finland	47	50	44	41	29	15
Sweden (1)	52	56	47	49	31	21
United Kingdom (1)	24	27	22	22	7	5
FYR of Macedonia	15	19	11	12	5	2
Turkey (1)	6	8	4	5	2	1
Iceland	61	65	56	55	37	27
Norway	57	61	54	52	30	28

(1) 2005.

Source: Eurostat (tsiir111, tsiir113, tsiir112 and tsc00018)

Percentage of individuals aged 16 to 74 who have used the Internet, in the last 3 months, for interaction with public authorities (i.e. having used the Internet for one or more of the following activities: obtaining information from public authorities web sites; downloading official forms; sending filled in forms). This indicator is broken down by purpose (obtaining information; obtaining forms; returning filled in forms) and covers all individuals aged 16 to 74.

Table 12.13: Proportion of enterprises that have remote employed persons who connect to IT systems from home, 2006 (1)

(% of enterprises)

	Total (10 or more persons employed)	Small (10 to 49 persons employed)	Medium (50 to 249 persons employed)	Large (250 or more persons employed)
EU-27	17	13	30	55
Euro area	15	11	30	57
Belgium	27	21	50	71
Bulgaria	9	9	10	17
Czech Republic	19	15	31	48
Denmark	53	46	81	95
Germany	21	15	39	65
Estonia	22	18	34	53
Ireland	25	20	38	59
Greece	16	14	25	52
Spain	8	5	17	40
France	:	:	:	:
Italy	3	2	7	23
Cyprus	14	10	28	62
Latvia	7	5	12	27
Lithuania	12	11	13	30
Luxembourg	19	16	25	66
Hungary	10	8	16	36
Malta	:	:	:	:
Netherlands	35	29	56	85
Austria	20	16	37	64
Poland	4	3	8	15
Portugal	9	7	21	49
Romania	7	6	9	20
Slovenia	26	23	32	65
Slovakia	13	12	17	34
Finland	32	24	56	77
Sweden	39	34	59	84
United Kingdom	32	26	49	79
Iceland	47	42	67	66
Norway	49	44	78	94

(1) Enterprises with 10 or more full-time persons employed; enterprises that have their main activity in NACE Sections D, F, G, I and K or NACE Groups 55.1, 55.2, 92.1 and 92.2.

Source: Eurostat (isoc_ci_tw_e)

Table 12.14: Enterprises using the Internet for interacting with public authorities, 2006 (1)

(% of enterprises)

	E-government usage by enterprises	Obtaining information	Downloading official forms	Returning filled in forms
EU-27	63	55	55	44
Euro area	65	55	57	46
Belgium	59	53	44	37
Bulgaria	46	43	36	23
Czech Republic	76	72	66	32
Denmark	87	81	81	55
Germany	49	36	42	37
Estonia	69	66	64	54
Ireland	84	75	77	56
Greece	84	71	67	76
Spain	58	53	54	38
France	66	58	59	51
Italy	87	75	74	49
Cyprus	44	44	34	8
Latvia	40	37	35	21
Lithuania	76	68	74	56
Luxembourg	83	72	79	32
Hungary	45	43	42	28
Malta	:	:	:	:
Netherlands	70	63	64	61
Austria	81	56	76	54
Poland	61	50	47	56
Portugal	60	53	53	54
Romania	39	38	34	13
Slovenia	75	71	65	49
Slovakia	77	68	69	45
Finland	93	86	89	78
Sweden	80	78	78	53
United Kingdom	52	51	48	38
Iceland	95	85	79	81
Norway	74	68	68	62

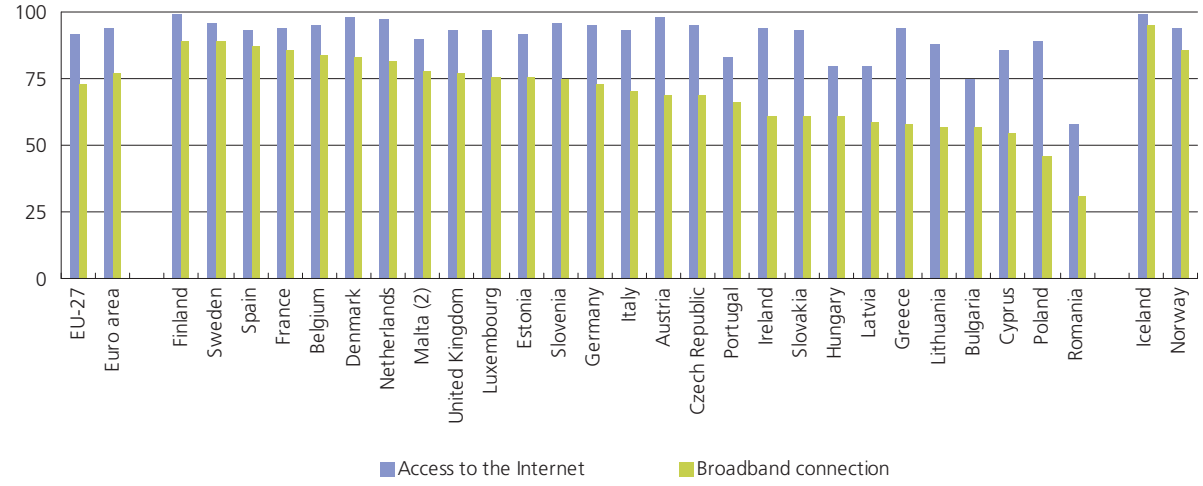
(1) Enterprises with 10 or more full-time persons employed; enterprises that have their main activity in NACE Sections D, F, G, I and K or NACE Groups 55.1, 55.2, 92.1 and 92.2.

Source: Eurostat (tsiir120 and tsc00019)

Percentage of enterprises using the Internet to interact with public authorities (i.e. having used the Internet for one or more of the following activities: obtaining information; downloading forms; filling-in web-forms). This indicator is broken down by purpose (obtaining information; obtaining forms; returning filled in forms) and covers all enterprises with 10 or more full-time employees. The enterprises have their main activity in NACE Sections: D, F, G, H (Groups 55.1 - 55.2), I, K, O (Groups 92.1 - 92.2 only).

Figure 12.16: Internet access and broadband connections among enterprises, 2006 (1)

(% of enterprises)



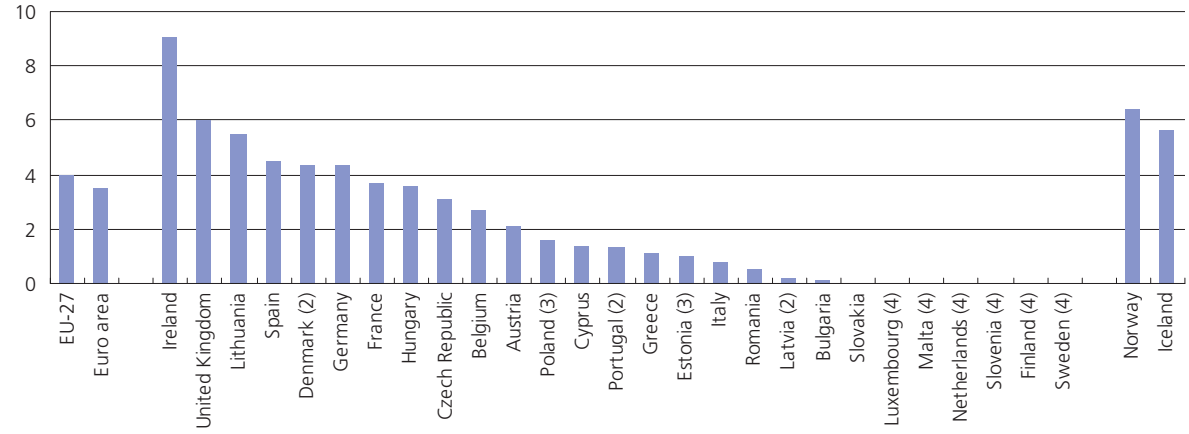
(1) Enterprises with 10 or more full-time persons employed; enterprises that have their main activity in NACE Sections D, F, G, I and K or NACE Groups 55.1, 55.2, 92.1 and 92.2.
(2) 2005.

Source: Eurostat (tsc00016 and tsc00017)

This indicator consists of enterprises with 10 or more full-time employees. The enterprises have their main activity in NACE Sections: D, F, G, H (Groups 55.1 - 55.2 only), I, K, O (Groups 92.1 - 92.2 only). The availability of broadband is measured by the percentage of enterprises that are connectable to an exchange that has been converted to support xDSL-technology, to a cable network upgraded for Internet traffic, or to other broadband technologies.

Figure 12.17: Proportion of enterprises' total turnover from e-commerce via Internet, 2006 (1)

(%)



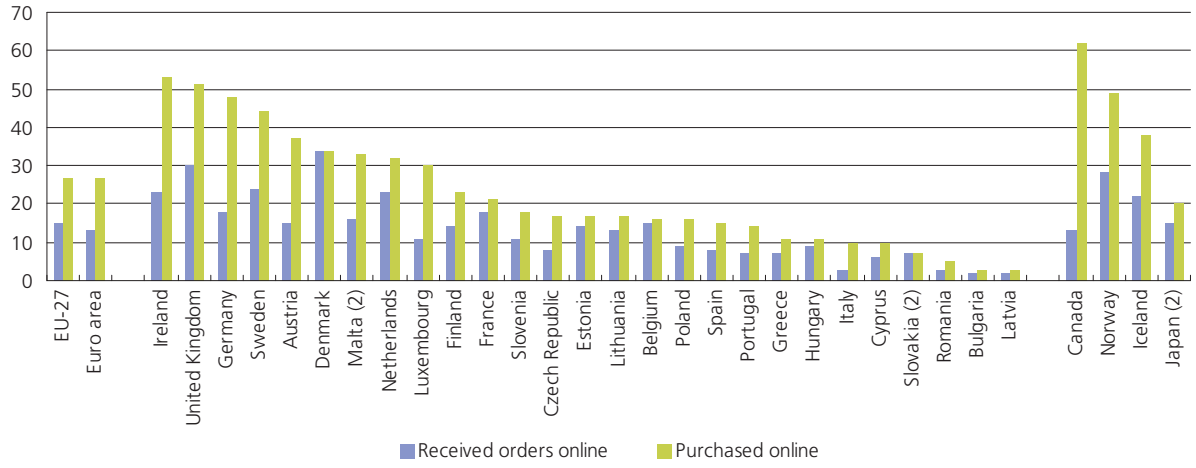
(1) Enterprises with 10 or more full-time persons employed; enterprises that have their main activity in NACE Sections D, G, I and K or NACE Groups 55.1 and 55.2.
(2) 2004.
(3) 2005.
(4) Not available.

Source: Eurostat (tsiir080)

Information comes from the surveys carried out by the National Statistical Institutes on usage of information and communication technologies (ICT) by enterprises. The indicator is calculated as the enterprises' receipts from sales through the Internet as percentage of the total turnover. Sales through other networks are not included, leaving out for instance EDI-based sales. Only enterprises with 10 or more employees are covered. The year given relates to the survey year. The e-commerce data relates to the year prior to the survey.

Figure 12.18: Enterprises having received orders/made purchases online, 2006 (1)

(% of enterprises)



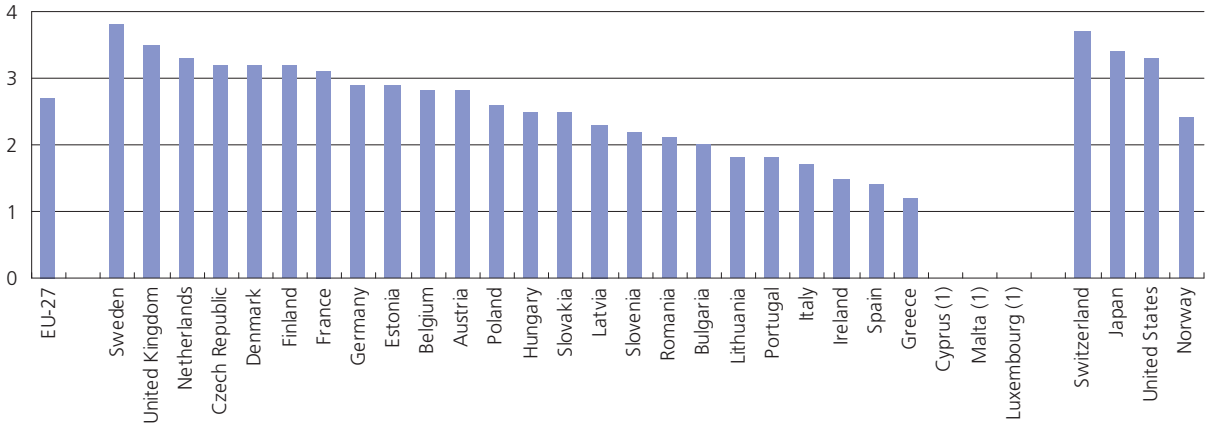
(1) Enterprises with 10 or more full-time persons employed; enterprises that have their main activity in NACE Sections D, F, G, I and K or NACE Groups 55.1, 55.2, 92.1 and 92.2.
(2) 2005.

Source: Eurostat (tsc00022 and isoc_ec_ebuy)

This indicator covers online selling via Internet and EDI or other networks within the previous year. Only enterprises buying/selling more than 1 % online are included. Enterprises with 10 or more full-time employees are covered. The enterprises have their main activity in NACE Sections: D, F, G, H (Groups 55.1 - 55.2), I, K, O (Groups 92.1 - 92.2 only). The year given relates to the survey year. The e-commerce data relates to the year prior to the survey.

Figure 12.19: Information technology expenditure, 2006

(% of GDP)



(1) Not available.

Source: Eurostat (tsiir071), European Information Technology Observatory (EITO)

Annual data on expenditure for IT hardware, equipment, software and other services as a percentage of GDP.

12.6 TELECOMMUNICATIONS

INTRODUCTION

The European telecommunications sector was historically characterised by public service, monopoly providers, often run in conjunction with postal services. Liberalisation moves began in the first half of the 1980s and, at first, concerned value added services or business users, while basic services were left in the hands of monopoly providers. By 1998, telecommunications were, in principle, fully liberalised across all of the Member States. The liberalisation of telecommunication markets has led to considerable reductions in prices. This may, in part, reflect the introduction of competition into a number of markets that were previously the domain of incumbent, monopoly suppliers, as well as reflecting technological changes that have increased capacity and made it possible to communicate not only by voice, but also over the Internet.

Main telephone lines are the traditional way of connecting to communication networks. They are usually used for voice telephony, but may also be used for accessing the Internet via a modem or dial-up connection. The rapid growth of the more powerful means to access the Internet (broadband) and mobile communications has eroded somewhat the market for traditional fixed telecommunication networks.

Mobile phones were first introduced into Europe during the early 1980s. Constrained by weight and power supply requirements, they were initially confined to cars. As mobile phones became lighter, cheaper and technically more advanced, their market grew rapidly from the second half of the 1990s.

DEFINITION AND DATA AVAILABILITY

Eurostat's data collection exercise in relation to telecommunications statistics is conducted through the use of a predefined questionnaire (TELECOM), which is sent on annual basis to the national statistical institutes. They collect information from their relevant regulatory authorities and send the completed questionnaires back to Eurostat.

Indicators presented in relation to market share refer to fixed-line telecommunications and mobile telephony. The market share of the incumbent for fixed-line telephony is defined as the enterprise active in the market just before liberalisation and is calculated on the basis of retail revenues.

Indicators relating to the mobile market refer to the number of subscriptions to public cellular mobile telecommunication systems and also include active pre-paid cards. Note that an increasing number of people have multiple mobile subscriptions (for example, for private and work use).

Data on expenditure for telecommunications covers hardware, equipment, software and other services. Both of these indicators are included within the structural indicators. The data are not collected by Eurostat; further methodological information is available at: http://www.eito.com/.

Telecommunications prices are based on the price (including VAT) in euro of a 10-minute call at 11 am on a weekday in August, based on normal rates. Three markets are presented, namely a local call (3 km), a national long distance call (200 km) and an international call (to the United States). These indicators are included within the structural indicators. The data are not collected by Eurostat; further methodological information is available at: http://www.teligen.com/.

MAIN FINDINGS

Although overall expenditure on telephony has increased, the proportion accounted for by ex-monopoly providers has generally been reduced, as the share of the total telecommunication market accounted for by fixed-line voice operations has shrunk, while growth has been concentrated in areas associated with mobile and other data service providers.

The relative importance of telecommunications expenditure was higher, accounting for 3.0 % of GDP in the EU-27 in 2006, compared with 2.1 % in the United States and 4.2 % in Japan.

In 2005, the rate of mobile subscriptions per 100 inhabitants often stood close to 100, and in 13 of the Member States even surpassed this level; note that one person may have more than one subscription, privately or for professional use.

Mobile telephony generally displays much lower market shares for incumbents than traditional fixed line telephony. In 2006, the market share of the leading operator in mobile telecommunications averaged 39 % in the EU-25, compared with a 56 % market share for the incumbent in fixed telecommunications in relation to international calls. The relative importance of incumbents was considerably higher for national long distance and local calls, rising to averages of 66 % and 72 % respectively.

The price of telecommunications fell between 2004 and 2006 in a large number of Member States. Price reductions were most apparent for national long distance and international calls (defined here as calls to the United States), as on average in the EU-25 the price of a national long distance call was reduced by almost 20 % overall between 2004 and 2006, while the price of an international call was reduced by almost 16 %. In comparison, there was a modest reduction in the price of a local call, which was reduced by less than 3 %.

The prices of local, national long distance or international calls varied greatly across the Member States in 2006. Local and national distance calls were most expensive in Slovakia, while the price of international calls was highest in Latvia. The cheapest tariff for local calls was found in Spain, for national long distance calls in Cyprus, and for calls to the United States in Germany.

SOURCES

Statistical books

Science, technology and innovation in Europe

Pocketbooks

Science, technology and innovation in Europe – 2007 edition

Dedicated sections on the Eurostat website

Information society

Website data

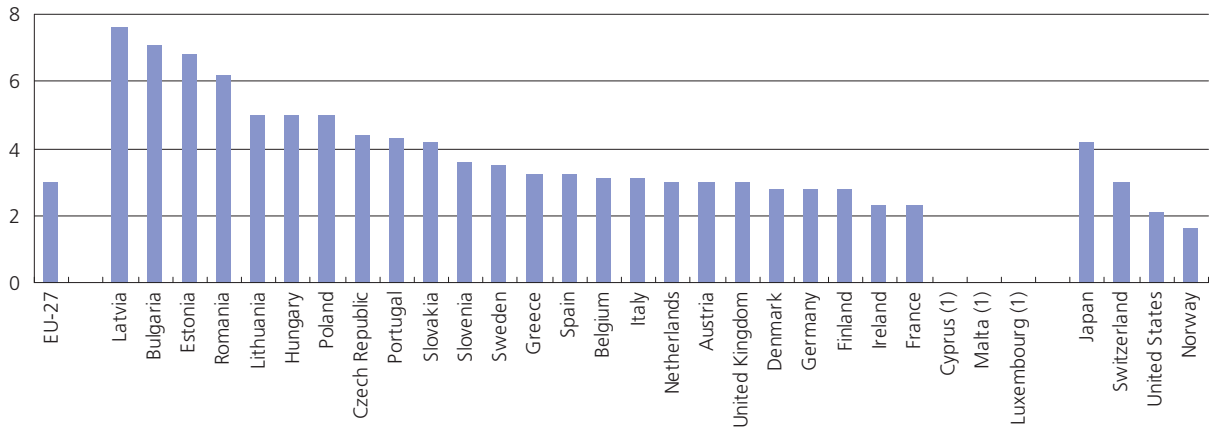
Information society statistics

Information society: structural indicators

Computers and the Internet in households and enterprises

Figure 12.20: Telecommunications expenditure, 2006

(% of GDP)



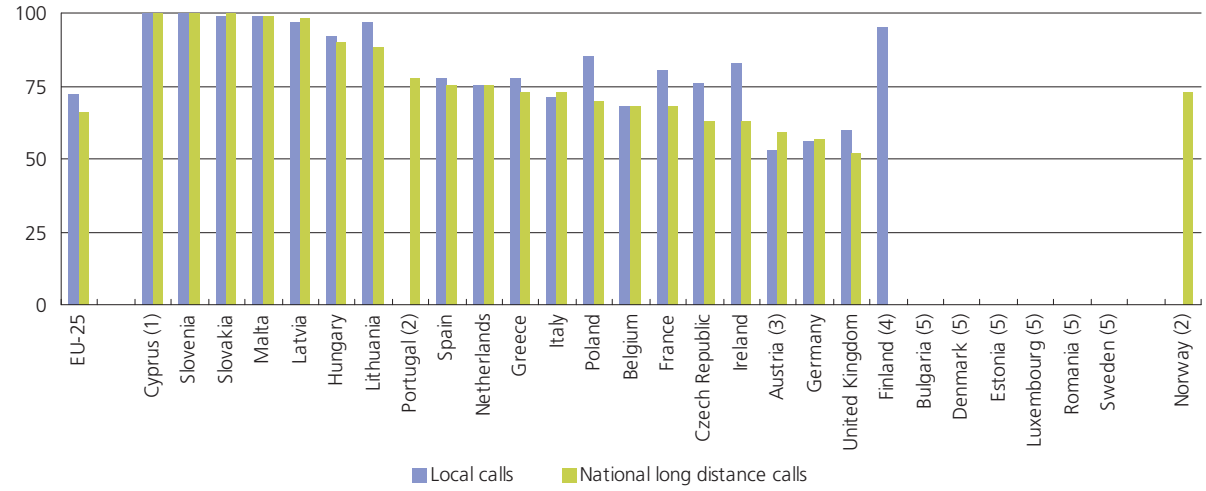
(1) Not available.

Source: Eurostat (tsiir072), European Information Technology Observatory (EITO)

Annual data on expenditure for telecommunication hardware, equipment, software and other services as a percentage of GDP.

Figure 12.21: Market share of the incumbent in fixed telecommunications, 2005

(% of total market)



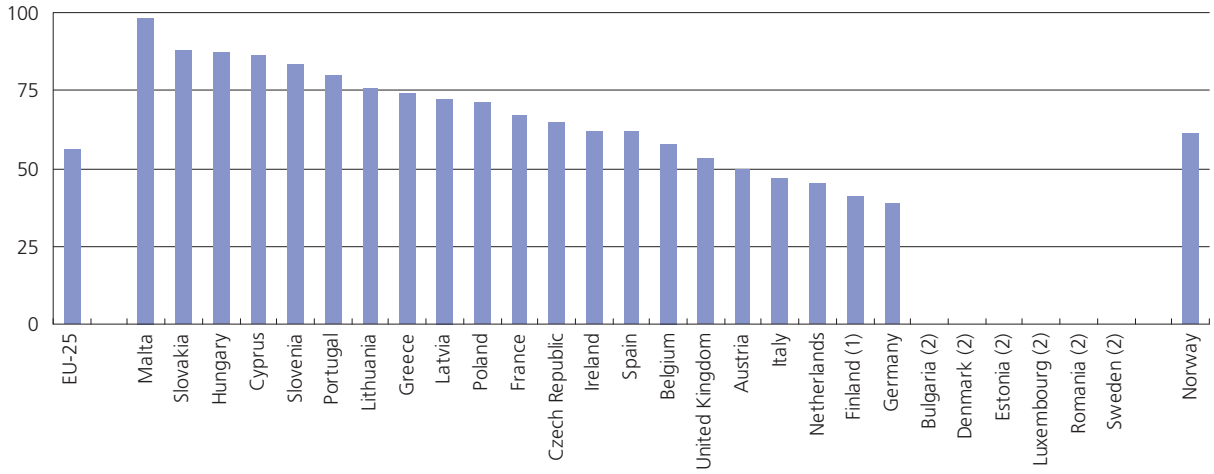
(1) 2003.
(2) Local calls, not available.
(3) 2004 for local calls.
(4) National long distance calls, not available.
(5) Not available.

Source: Eurostat (tsier0321 and tsier0322), National Regulatory Authorities

The incumbent is defined as the enterprise active on the market just before liberalisation. The market share is calculated as the share of the incumbent's retail revenues of the total market.

Figure 12.22: Market share of the incumbent in fixed telecommunications, international calls, 2005

(% of total market)

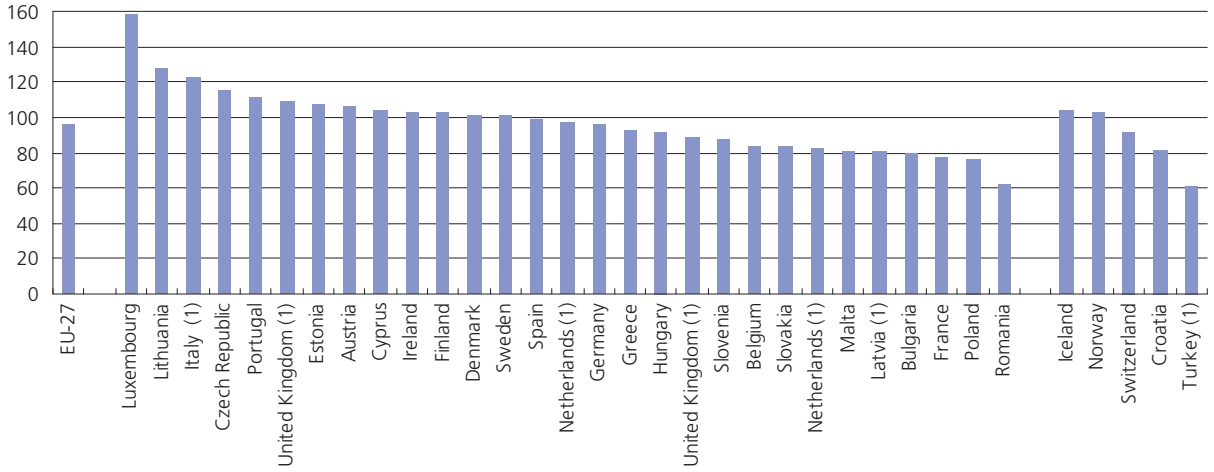


(1) 2004.
(2) Not available.

Source: Eurostat (tsier033), National Regulatory Authorities

Figure 12.23: Mobile phone subscriptions, 2005

(average number of subscriptions per 100 inhabitants)



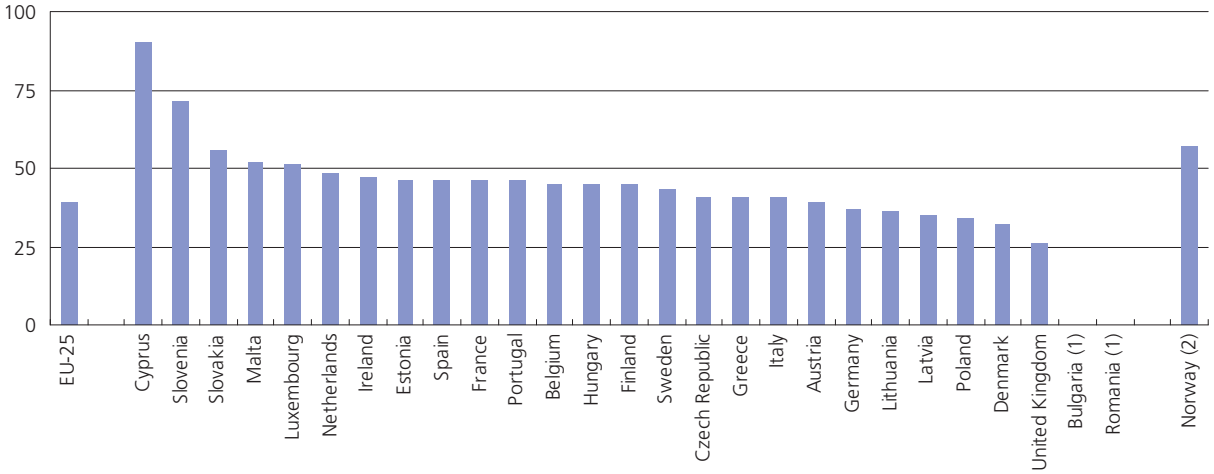
(1) Source: International Telecommunication Union (ITU).

Source: Eurostat (tsc00014)

This indicator shows the number of subscriptions to public mobile telecommunication systems using cellular technology related to the population. The total number of mobile subscriptions in the country is divided by the number of inhabitants of the country and multiplied by 100. Active pre-paid cards are treated as subscriptions. One person may have more than one subscription.

Figure 12.24: Market share of the leading operator in mobile telecommunications, 2006

(% of total market)



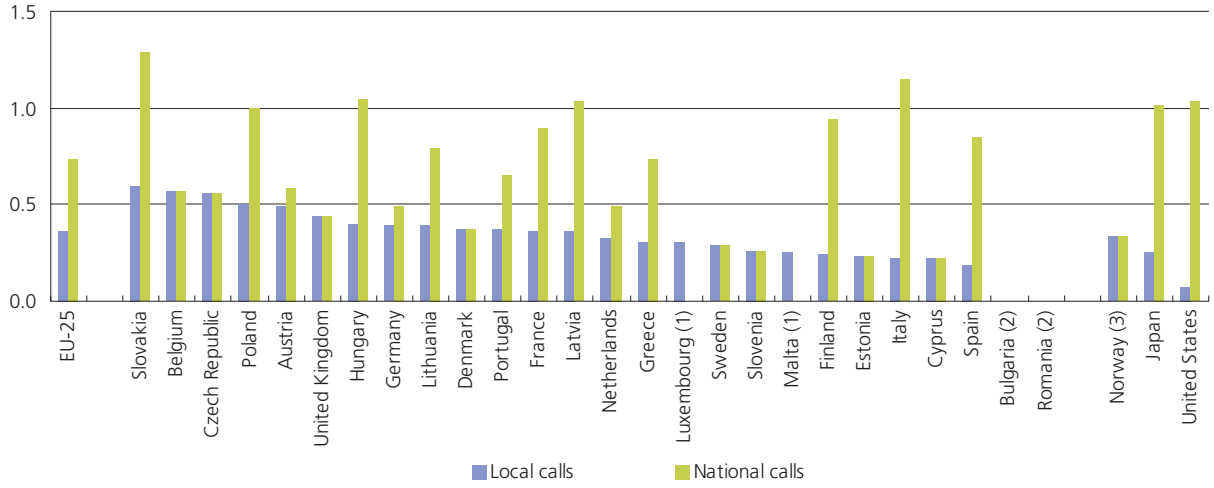
(1) Not available.
(2) 2005.

Source: Eurostat (tsier033), National Regulatory Authorities

The market share of the leading operator is calculated on the basis of the estimates of the number of mobile subscribers. The share of the leading operator of all subscriptions in mobile telecommunication is given.

Figure 12.25: Price of fixed telecommunications, 2006

(EUR per 10-minute call)



(1) No distinction between local and national long distance; all calls are local.
(2) Not available.
(3) 2005.

Source: Eurostat (tsier0211 and tsier0212), Teligen

The first indicator gives the price in euro of a 10-minute call at 11 am on a weekday (including VAT) for a local call (3 km).

The second indicator gives the price in euro of a 10-minute call at 11 am on a weekday (including VAT) for a national call (200 km). The prices refer to August each year. Normal tariffs without special rates are used.

Table 12.15: Price of fixed telecommunications

(EUR per 10-minute call)

	Local calls			National long distance calls			Calls to the United States		
	2004	2005	2006	2004	2005	2006	2004	2005	2006
EU-25	0.37	0.35	0.36	0.92	0.76	0.74	2.13	2.11	1.79
Belgium	0.57	0.57	0.57	0.57	0.57	0.57	1.98	1.98	1.98
Bulgaria	:	:	:	:	:	:	:	:	:
Czech Republic	0.56	0.56	0.56	1.46	1.13	0.56	3.64	2.02	2.02
Denmark	0.37	0.37	0.37	0.37	0.37	0.37	2.38	2.38	2.38
Germany	0.42	0.39	0.39	1.20	0.49	0.49	1.23	1.23	0.46
Estonia	0.23	0.23	0.23	0.23	0.23	0.23	2.26	2.10	2.13
Ireland	0.49	0.49	0.49	0.82	0.82	0.82	1.91	1.91	1.91
Greece	0.31	0.31	0.31	0.73	0.74	0.74	2.91	2.93	3.49
Spain	0.28	0.28	0.19	0.88	0.84	0.85	1.53	1.53	1.53
France	0.39	0.33	0.36	0.96	0.83	0.89	2.24	2.27	2.32
Italy	0.25	0.22	0.22	1.15	1.15	1.15	2.12	2.12	2.12
Cyprus	0.20	0.22	0.22	0.20	0.22	0.22	0.80	0.66	0.66
Latvia	0.36	0.36	0.36	1.03	1.03	1.03	5.94	5.94	5.94
Lithuania	0.39	0.39	0.39	0.79	0.79	0.79	4.07	4.07	4.07
Luxembourg	0.31	0.31	0.31	:	:	:	1.37	1.37	1.37
Hungary	0.41	0.41	0.40	1.09	1.09	1.04	2.43	2.97	2.88
Malta	0.25	0.25	0.25	:	:	:	1.65	1.77	1.64
Netherlands	0.33	0.33	0.33	0.49	0.49	0.49	0.85	0.85	0.85
Austria	0.49	0.49	0.49	0.59	0.59	0.59	1.90	1.90	1.90
Poland	0.35	0.30	0.50	1.22	1.22	1.00	3.67	3.74	1.23
Portugal	0.40	0.37	0.37	0.65	0.65	0.65	3.06	3.11	3.11
Romania	:	:	:	:	:	:	:	:	:
Slovenia	0.26	0.26	0.26	0.26	0.26	0.26	1.75	1.40	1.40
Slovakia	0.60	0.60	0.60	1.29	1.23	1.29	3.02	3.02	1.23
Finland	0.24	0.24	0.24	0.90	0.94	0.94	4.77	4.90	4.90
Sweden	0.29	0.29	0.29	0.29	0.29	0.29	1.06	1.06	1.18
United Kingdom	0.44	0.44	0.44	0.44	0.44	0.44	2.08	2.08	2.23
Norway	0.32	0.34	:	0.32	0.34	:	0.82	0.77	:
Japan	0.25	0.25	0.25	1.02	1.02	1.02	4.39	4.39	4.34
United States	0.07	0.07	0.07	1.03	1.03	1.03	-	-	-

Source: Eurostat (tsier0211, tsier0212 and tsier0213), Teligen

The indicator gives the price in euro of a 10-minute call at 11 am on a weekday (including VAT) for an international call (to the United States). The prices refer to August each year. Normal tariffs without special rates are used.